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AN EXPERIMENTAL STUDY OF PULMONARY EMBOLISM

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THE following experiments were performed to ascertain the true mechanism involved in the production of death from pulmonary embolism in experimental animals.

The supposition of one of us (G.E.H.) was that: (1) when an embolus broke free from a venous thrombosis it was carried by the blood stream to the right heart and into the main pulmonary artery; (2) at or just beyond the bifurcation, there existed a plexus of nerve fibres which was excited by the stretching of the artery as the embolus was forced against this area with each systole of the heart; (3) this excitation was transmitted either reflexly to the vagal endings of the heart, causing inhibition and cardiac death, or to the respiratory centre, causing a respiratory death.

A review of the current literature revealed many articles dealing with the clinical, statistical and operative aspects of the problem, but very few had any relationship to the experimental aspect. Virchow[1] based his theory of embolism on anatomical, clinical and experimental investigations. Later, Cohnheim,[2] Cohn[3] and Welch[4] confirmed Virchow's work and added greatly to the knowledge concerning embolism. Other workers have performed experiments on the problem of pulmonary embolism, but the main purpose of their researches has been either to attempt the production of lung infarcts or to determine the site of the embolus at the time of death.

Schumacher[5] has distinguished three main types of clinical pulmonary embolism, in so far as they cause death: (*a*) within a few minutes, and due to complete obstruction of the pulmonary circulation; (*b*) after considerable delay, due to a partial blockage with subsequent increase of thrombus which completes the obstruction of pulmonary circulation; (*c*) due to some obscure cause, after which only a partial obstruction of the artery can be found.

Mann,[6] in 1917, found that it was impossible to produce sudden death in dogs by emboli unless almost complete obstruction of the pulmonary circulation had been obtained, irrespective of the type of anæsthesia (ether or local). Haggart and Walker,[7] by a rather ingenious method using compression, showed that it requires between 52 and 66 per cent occlusion of the pulmonary artery in the cat to cause sudden death. The critical point, after which death ensued, was sharply defined. They also failed to establish the true mechanism involved. Karsner,[8] even admitting the evidence of Mann's experiments, suggests that plugging of a main branch of the pulmonary artery may cause death by "an intrathoracic reflex inhibition of the heart."

Our experiments were confined to the introduction of thrombotic emboli into the pulmonary artery and an investigation of the mechanism involved in the consequent production of sudden death. The question of thrombosis, the factors influencing its formation and the release of the embolus will not be considered in the present paper. The experimental work evolved into four phases:

1. The identification of a definite and specific nerve supply to the pulmonary artery.

2. The effects of occlusion of a branch of and of the main pulmonary artery by external pressure.

3. The introduction of emboli into the pulmonary artery, with a study of the events occurring from the time of introducing the clot until death supervened.

4. The stimulation of the intima of the pulmonary artery by means of (a) a minimal faradic current, and (b) distension of the artery with and without occlusion.

Each of these four phases of the work has been dealt with separately; the results of one have induced us to proceed with each subsequent group of experiments.

PHASE I.

THE NERVE SUPPLY TO THE PULMONARY ARTERY

It is now agreed that peripheral vasomotor tone and general blood-pressure are reflexly regulated by the carotid sinus and aortic nerves. The fine sensory nerve endings in the sinus caroticus and in the aortic arch lie in the adventitia and media coats. Any increase in blood-pressure stimulates these nerve endings with a reflex vaso-dilatation and cardiac inhibition and a consequent decrease in blood-pressure. It was thought, then, that a similar plexus of nerves might exist in the pulmonary artery, which, stimulated by an embolus, might reflexly affect either the vagus control of the heart or the respiratory centre. Using the nerve injection fluid of Funaoka[9] (ultramarine—2 parts, oil of turpentine—3 parts, and ether—15 parts) an endeavour was made to trace the nerves of the pulmonary artery. This method was not satisfactory in our hands. Various modifications were tried, including the use of dekalin, as advocated by Yuien and Sato,[10] but the results were unsatisfactory. We therefore abandoned the injection method and dissected the vagus nerves very carefully in a large number of rabbits and dogs.

In the rabbit three nerves were found within the vagus sheath. The vagus itself was easily separated and was traced downward, giving off its recurrent laryngeal branch, its cardiac branches, and then continuing downwards on the lateral side of the œsophagus to pass through the diaphragm. The right vagus, at the level of the arch of the aorta, gives off several branches to the cardiac plexus, and, continuing distally, many large branches lying inferior to the pericardium join the left vagus; the smaller terminal branch continues along the lateral side of the œsophagus through the diaphragm. In company with the vagus nerve two smaller nerves were dissected out, the aortic or depressor nerve and the cervical sympathetic. These are fairly readily separated, but just above the level of the stellate ganglion the two nerves join together. Many branches are given off from this junction to the stellate ganglion and to the cardiac plexus. One and sometimes two small branches may be traced directly to the pulmonary artery, as is also the case with a few branches from the left recurrent laryngeal nerve. The stellate ganglion appears to be the focal point in an extensive network of nerves connecting the sympathetic, vagus, left recurrent, depressor (aortic), cardiac and pulmonary nerves. In the dog this same arrangement holds, except that a separate aortic depressor is absent, being intimately connected within the vagus itself. Further dissection revealed several small, fine nerve twigs passing through the dense fibrous band which connects the pulmonary artery and the aortic arch. These nerve twigs extend from the cardiac plexus around the pulmonary artery at its bifurcation. Whether they are afferent or efferent, vasodilator or vaso-constrictor fibres has yet to be determined.

Karsner,[11] in 1911, showed that the media of the pulmonary artery of the dog possesses a definite nerve supply which is capable of histological demonstration. At the same time, Wood[12] proved the existence of a vasomotor supply to the pulmonary artery. By our own dissections we demonstrated the presence of a pulmonary plexus directly communicating with the vagus and sympathetic systems. The presence of this plexus and the results of Karsner's and Wood's work supported our theory and induced us to proceed with the next phase of the problem.

PHASE II.

EFFECT OF OCCLUSION OF THE PULMONARY ARTERY BY EXTERNAL PRESSURE

(a) *Occlusion of a main branch.*—Experiments were performed on rabbits, under urethane anæsthesia, and on dogs under ether. A tracheal cannula was inserted and connected to a Brodie pump for artificial respiration. A cannula was tied into the left carotid artery and connected with a spring manometer of the Fick type for registering aortic blood-pressure. The chest was opened, artificial respiration instituted, and a "Schafer" pulmonary cannula tied into the pulmonary artery through the wall of the right ventricle.[13] This cannula was connected to a water manometer, to which was attached an Ellis piston-recorder for registering pulmonary arterial blood-pressure on a kymograph.

The degree of ventilation of the lungs (the chest being open) was varied by changing the stroke of the Brodie pump. Increasing the amount of air entering the lungs of a rabbit caused an increase in pulmonary blood-pressure

and a slight decrease in aortic blood-pressure. Increasing the degree of ventilation still further caused a further increase in pulmonary blood-pressure and another slight fall in aortic blood-pressure. When the degree of ventilation was decreased to about the normal, there was a sudden decrease in pulmonary blood-pressure and a corresponding increase in aortic blood-pressure. These effects were purely mechanical. When the lungs received a greater blast of air from the pump their capillaries tended to be flattened; thus the peripheral resistance was

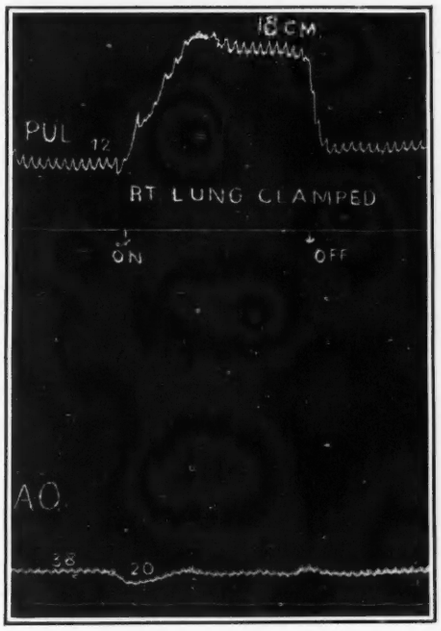


CHART I.—Rabbit, 1800 gm., ♀ Urethane. Open chest. Effect of clamping right bronchus and pulmonary artery. The upper record "Pul." shows the pulmonary arterial blood-pressure in cm. of water, the lower, "AO", the aortic blood-pressure in mm. of mercury. Clamping the right pulmonary artery causes an abrupt and sustained increase in pulmonary and a transitory fall in aortic blood-pressure.

increased and the pulmonary arterial pressure rose, while the diminished flow into left heart caused a fall in aortic blood-pressure.

When the whole right lung of the rabbit was shut off by clamping the right pulmonary artery, near the hilus, there was a sudden increase in pulmonary blood-pressure from about 12 to 18 cm. of water and a slightly delayed and brief decrease in aortic pressure of about 18 mm. Hg. (Chart I). When the clamp was released the pulmonary blood-pressure rapidly returned to normal. The rise in pulmonary blood-pressure was caused principally by the obstruction to the artery, but reinforced by the increased distension of the unblocked lung, which now received from the Brodie pump the blast formerly distributed to both lungs. The temporary fall in aortic blood-pressure was a consequence of the diminished filling of the left heart, but within twenty seconds the pulse-pressure and blood-pressure were restored to the normal, an evidence of a compensatory increase in circulation through the unblocked lung. In another rabbit we were able to tie off the whole of the left pulmonary artery and the branches to the upper and middle lobes of the right lung, or practically four-fifths of the aerating surface of the lungs. There was a considerable rise in pulmonary blood-pressure, but the decrease in systemic blood-pressure, although considerable, was not as great as one might expect.

In the dog, clamping one or other of the main pulmonary branches, the bronchus being quite free, caused the pulmonary blood-pressure to increase abruptly from 16 to 28 cm. of water, where it was well maintained. It fell just as abruptly when the clamp was removed. The effect upon the aortic blood-pressure was quite noticeable but brief. One would expect, then, that the lodging of a clot in a branch of the pulmonary artery would cause a sustained or permanent rise in pulmonary blood-pressure, and a brief fall in aortic pressure with perfect compensation as long as the right heart was not strained.

(b) *Occlusion of main artery.*—We determined the effect of gradual and total occlusion of the main pulmonary artery by ligation in three dogs whose hearts had been exposed for some time. A fine rubber tube was threaded around the pulmonary artery with an aneurysm needle, and aortic blood-pressure records were taken as the ligature was tightened. In one instance the tubing was tightened considerably, giving about 75 per cent occlusion, with only a moderate decrease in output per beat. There was no change in rate of the heart. When the ligature was tightened to the fullest extent the output per beat gradually decreased, in sixty seconds, to zero. When the tubing was released, seventy-two seconds after the output was zero, the heart began to expel blood again at the same rate as before. The artery was completely tied off for 132 seconds, with good recovery. In

another animal, the total occlusion for 36 seconds caused a rapidly progressive fall of pulse-pressure and blood-pressure to zero, without change in the heart rate. Upon release of the ligature the pressure and output gradually recovered. During partial occlusion, which we would conservatively estimate at 60 to 70 per cent, the aortic pressure fell considerably, but the output was good and the pressure well maintained at its new level.

Total occlusion thus had caused a condition which gave results similar to the massive plugging of the main pulmonary artery by clots introduced in subsequent experiments; the right heart was distended, the left empty; the heart continued to beat co-ordinately, although the left auricle was receiving no blood, and so the aortic pressure fell to zero. The animal was in a condition of shock; death would be due to this sudden anæmia. The heart was active and quite capable of taking care of any blood which came to its left chambers, so that on release of the ligature on the pulmonary artery, the circulation was restored and recovery possible. In dogs, practically total occlusion must occur and be maintained before death can take place. This is supported by the later experiments in which the animals survived massive distribution of clots throughout the branches of the pulmonary artery.

Our experiments do not support the conclusions of Haggart and Walker,[7] who claim that in cats 50 per cent occlusion is rapidly fatal. While it is possible that there are differences in the response of these animals, we feel that our results throw considerable doubt on the accuracy of their observations. It is not impossible that, since their occlusion was carried on with the chest closed, they produced much greater blocking than they judged.

PHASE III.

EFFECTS OF PULMONARY EMBOLISM IN THE DOG

(a) *Effect of releasing formed clots in a vein.*—Mason produced thrombosis by the injection of a saline extract of dried lung tissue into a centrally occluded vein. The methods of producing thrombotic emboli as used by Mason,[14] Homans,[15] Miller and Rogers,[16] and Mann,[6] were tried but were found unsatisfactory for our experiments. The method finally adopted was as follows.

Several long glass tubes (12″) of different bores (4 to 8 mm.) were prepared, each with a slightly bent tip, which was narrowed about 1-2 mm. less than the diameter of the tube. Blood from dogs was drawn into the tubes, which were then stoppered at one end and set upright in the ice-box over night. The next morning the clots were released into a dish of saline, the serum washed from the tube, and the clot replaced. In a few cases after releasing the clot from the tube it was placed into 10 per cent formalin salt solution for one-half hour and then washed many times in saline. This clot, being firm, elastic and non-friable, resembled the thrombotic embolus more closely than did the untreated clot.

The operations on the dogs were performed with ether anæsthesia under aseptic conditions. The vein, either femoral or external jugular, was exposed and then clamped with rubber tipped forceps, distal and proximal to the central exposed area. A longitudinal incision was made in the vein and the end of the curved tube containing the clot and saline was inserted. The proximal clamp was removed and, by means of a syringe attached to the end of the long tube, the clot was then forced into the vein. Five to 10 c.c. of physiological saline were injected to ensure the clot getting into the vena cava. The vein was sutured, the distal clamp removed and circulation again established. Ten experiments on seven dogs were carried out in this manner. Only typical experiments are reported.

EXPERIMENT 5

Fox terrier, No. 9, male, July 14, 1932.

A clot (15 x 0.4 cm.) was introduced into the left external jugular vein, followed by 5 c.c. saline. There was no evidence of distress over a period of 48 hours, after which the dog was killed and autopsied. The lungs and heart were removed and the lungs inflated. All lobes expanded well, were smooth and glistening, and in only two areas was there any congestion. In the right ventricle there was a flattened clot of about 0.4 x 0.7 x 2.0 cm., which was adherent to the endocardium, and in one place to a chorda tendinea. In the pulmonary artery the ends of two clots were seen. These, at the bifurcation, were found to be loosely joined to each other. In the right artery a small round clot was seen which was curled about itself and extended into the first large branch. It then proceeded distally and the two ends were seen in two different branches. Beyond these points the vessels were patent.

About 0.6 cm. from the bifurcation a large bolus-like clot was found in the left pulmonary artery. This mass was wound about itself and the two projecting loops were seen to lie in the vessels of different lobes. The vessels distal to these were patent. The terminal piece of the clot entered the vessel of the inferior lobe

and ended abruptly. The vessel beyond this point was patent (see Fig. 1).

EXPERIMENT 6

Mongrel, No. 10, female, July 18, 1932.

A large, firm clot (17 x 0.7 cm.) was introduced into the left external jugular vein:

10.20 a.m. Clot released—no evidence of distress.
10.40 " Post-anæsthetic period—quite quiet.
11.00 " Breathing rather heavily.
11.35 " Staggering—breathing heavily.
11.40 " Very restless; staggering gait; respiration deep and abdominal in type.
11.45 " Always turns anti-clock-wise; very restless. The dog gradually improved until 11.30 p.m., when it seemed almost recovered from its distress.

July 19, 1932 (24 hours later).

The dog had recovered from her distress, and it seemed unlikely that death would occur. Another clot of the same size as on July 18, 1932 (17 x 0.7 cm.), was introduced into the right external jugular vein. The vein was sutured and circulation re-established. There were no evidences of distress and five hours later the animal was killed and an autopsy performed. The heart and lungs were removed. The branches of the left pulmonary artery were completely plugged and of the right partly so; there was no embolus in the main pulmonary artery (see Fig. 2).

When the lungs were inflated they were smooth and glistening, uniformly pink with the exception of two small areas—one on the posterior surface of the left upper lobe, and the other on the posterior surface of the left lower lobe. On perfusion of the artery with saline all lobes except the left upper lobe seemed to fill and empty well.

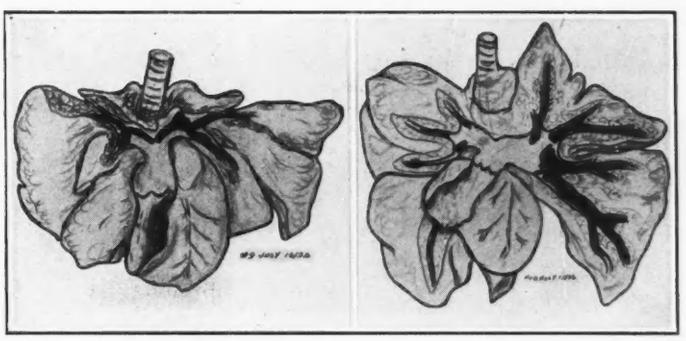


FIG. 1

FIG. 2

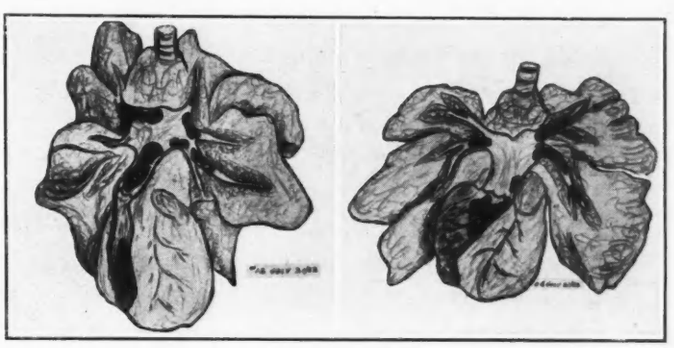


FIG. 3

FIG. 4

EXPERIMENT 8

Collie, No. 12, female, July 20, 1932.

10.20 a.m. A large clot (15 x 0.6 cm.) was introduced into the left external jugular vein, followed by 10 c.c. saline. The vein was ligated and the dog was in no apparent distress.
11.00 " Dog in apparently good health.

July 21, 1932 (24 hours later).

10.20 a.m. A clot larger in diameter (15 x 0.7 cm.) was introduced into the right external jugular vein.
10.21 " Respirations ceased; heart still beating.
10.23 " Dog breathing again, quietly, no struggling; respirations lasted for about 45 seconds.
10.24 " Stopped again; artificial respiration attempted and breathing was restored for a few seconds, but failed again.
10.25 " Dog died.

Immediate autopsy showed the heart still beating. The right heart was greatly distended and the left heart was quite empty. The right auricle and right ventricle beat fairly regularly for a time, but after a progressive heart-block stopped in diastole. On inflation the lungs expanded equally well and all the lobes were smooth and glistening. A large clot was found in the pulmonary artery, lying just beyond the valve cusps. Other large clots were seen in the right and left pulmonary arteries (see Fig. 3).

EXPERIMENT 10

Fox terrier, No. 6, male, July 7, 1932.

A clot (10 x 0.4 cm.) was introduced into the left femoral vein; the vein sutured, and the dog in very good condition.

July 21, 1932 (14 days later).—Dog in excellent condition.

3.21 p.m. A larger clot (14 x 0.6 cm.) was introduced into the left external jugular vein.
3.21 p.m. (14 seconds later)—The femoral pulse was lost, but the dog continued to breathe. The heart was still beating. Eight seconds later the femoral pulse could again be felt.
3.23 p.m. Respirations ceased; heart still beating and femoral pulse quite strong.
3.24 p.m. Femoral pulse becoming weaker; heart still beating fairly well.
3.24½ p.m. Respirations returned, rather slow and gasping in character; heart still beating and femoral pulse felt.
3.27 p.m. Respirations ceased, and a few minutes later the heart could no longer be felt.

The thorax was opened immediately. Both auricles and ventricles were still beating. In the right auricle and right ventricle, large, light red, jelly-soft clots were found. On tracing this ventricle clot upwards, it was seen to be attached to a large dark, formed, bolus-like clot which was situated just at the ventricular side of the cusps and was larger in size than the pulmonary orifice. This clot in turn was attached to a long, heavy but broken-up-like string of clots in the pulmonary artery. There were other masses of clot (rather loose) in the right and left pulmonary artery, towards the hilus, but no clots were found beyond these points (see Fig. 4).

From the ten experiments it was found that the introduction of clots smaller than those which would occlude the main pulmonary artery or the pulmonary orifice do not produce death. It was rather startling to find that such extensive plugging of the branches of the right and left pulmonary artery as indicated at autopsy did not produce any evidence of distress or uneasiness except in one case. No gross pathological lesions

were produced in the lungs by the non-fatal emboli, even when the first clot had remained as long as 14 days. Histological examination of the lung tissue, even in the occluded areas, did not reveal any significant gross pathological changes. Karsner and Ghoreyeb,[17] following experiments in which they plugged moderate-sized branches of the pulmonary artery in dogs without producing infarcts, discovered that there is sufficient collateral circulation in the lung that occlusion of such a branch does not disturb the local circulation unduly, particularly if an increase in pulmonary blood-pressure follows, while occlusion of the main branch to a lobe deprives that mass of lung of blood, except for the supply from the bronchial artery.

It appears that in order to produce death by the introduction of formed emboli, the emboli must be of such a size and consistency or of such amount as to remain in the main pulmonary artery, or, as in one experiment, to cause complete occlusion by blocking the pulmonary orifice.

(b) *The physiological processes involved in the production of sudden death by pulmonary embolus.* — Having shown definitely that we could produce sudden death by the release of prepared blood clots into the venous circulation, we attempted to trace the events as they occurred within the animal from the time the clot was liberated until it lodged in the pulmonary artery and caused death. By this means we hoped to determine the nature of death, whether from reflex respiratory or cardiac causes or from merely mechanical effects. Our first considerations were to note the effect on the respirations and on the aortic blood-pressure. Considering the possibility of a vagus effect, the vagi were exposed and each excited with a minimal current so that we had assurance that these nerves were active. Respirations were recorded by a Marey's tambour attached to a tracheal cannula, while aortic blood-pressure was recorded by a spring manometer connected to a carotid cannula.

EXPERIMENTAL

July 22, 1932, mongrel, No. 11, male; ether.

A rather soft formalin clot (12 x 0.4 cm.) was introduced into the right external jugular vein. Seventeen seconds after the clot was introduced the systemic blood-pressure fell considerably (40 mm. Hg.). There was a noticeable fall in pulse pressure. Within 22 seconds the aortic pulse-pressure and blood-pressure were restored to the normal (Chart II). The condition was a duplication of the effect of clamping a branch of the pulmonary artery in the previous experiments. The respirations were not affected.

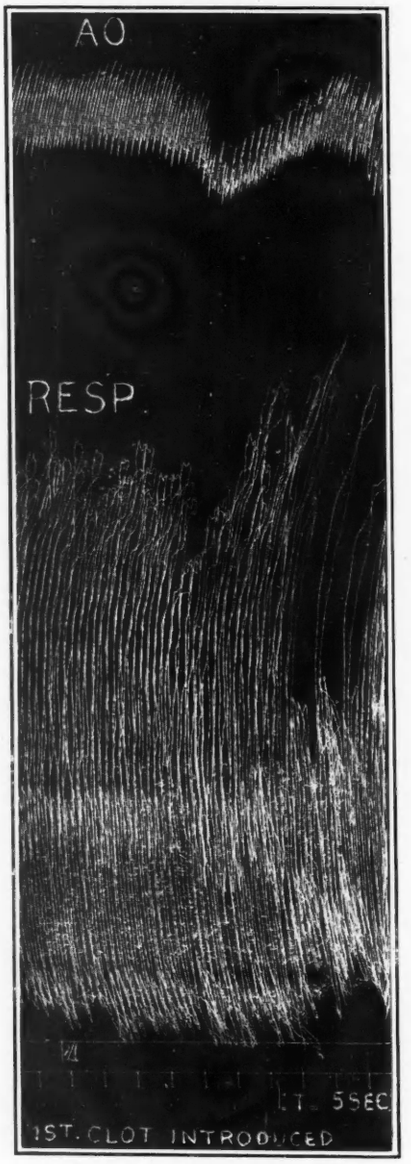


CHART II.—Dog, 6.7 Kg., ♂ Ether. Effect of an embolus in main branch of pulmonary artery. The upper record "AO" shows the aortic blood-pressure, the second, the respirations, the third the signal of clot injection, and the last, the time in 5 sec. intervals. A clot was introduced into the femoral vein; it lodged in a main branch of the pulmonary artery and caused a fall in aortic blood-pressure lasting for 17 seconds, after which the pressure became normal.

A second, larger clot (10 x 0.6 cm.) was then introduced into the same vein. The blood-pressure began to fall 20 seconds after the clot was introduced. With the falling blood-pressure the beats were less powerful, but there was no change in rate until the pressure had fallen to zero, when the registered beats became feeble

and slow. The diastolic blood-pressure fell to zero 63 seconds after the clot was introduced, while the last beat was recorded 1 minute and 57 seconds later. The first slowing of respiration was noticed 1 minute after the clot was introduced. Apnœa lasted for 1 minute and 35 seconds, followed by four powerful respiratory efforts and then two feeble attempts. This period lasted for 35 seconds, during which no heart beats were recorded.

The chest was opened immediately. The heart showed feeble co-ordinate beats. The right heart was distended, the left empty. The right auricle was beating more rapidly than the ventricles; the left auricle was empty and quiet. There was no fibrillation. The heart was opened, and small, broken pieces of clot were found in the right auricle and right ventricle, as well as in the main pulmonary artery and most of its branches. There was considerable plugging of the distal branches of the left lung. Death was evidently due to the mechanical effect of total blocking of the main pulmonary artery by the clot in it and in the orifice.

Experiments of this nature were done on five dogs. When the clots introduced were too small to plug the main pulmonary artery, they always caused a brief fall in aortic blood-pressure, (Chart II) with, from the evidence of experiments in Phase II, a probable permanent rise in pulmonary blood-pressure. The fall in aortic blood-pressure never lasted for longer than 25 seconds, after which the aortic pulse-pressure returned to normal, distinct evidence of a favourable adjustment of the pulmonary circulation. There is apparently a considerable compensation possible either in the force of the right ventricular beat, the dilatation of the pulmonary arteriole walls, the opening up of fresh capillaries, or the collateral circulation described by Karsner. It seems obvious, too, that the amount of lung tissue in use ordinarily is much more than is necessary to serve respiratory requirements during rest.

When the larger lethal clots were introduced, (Chart III), the blood-pressure fell very rapidly, with decreasing output per beat, until in a few seconds no expulsions were recorded. During the period of the sudden decrease in blood-pressure, the so-called "shock" period, the heart rate did not alter, but after expulsion of blood had ceased the recorded heart beats became slower and less easily distinguished. The last recorded beats usually appeared about 90 to 120 seconds after the introduction of the clot. At this time the beats were heard with a stethoscope and were definitely much faster than normal. Almost immediately, the second heart sound was no longer audible. The first sound, on the other hand, was heard for periods varying between 3 and 8¼ minutes after the introduction of the lethal clot. The sequence of events as recorded by the respiratory tracings was uniform in all the experiments. At the instant when the clot was introduced very little, if any, change occurred. About 25 seconds afterwards the respirations gradually decreased in amplitude until a period of apnœa resulted (Chart III). The period of apnœa usually lasted about 30 seconds. This was always followed by a series of slow, heavy, respiratory efforts. It was during this period of slow, deep breathing that the heart, as already mentioned, was beating more quickly,

CHART III.—Dog. 5 Kg., ♀ Ether. Effect of embolus blocking the main pulmonary artery. The first record is of aortic blood-pressure, the second, of the respirations, the third, the signal of injection, and the last, the time record in 5 second intervals. A large clot was introduced into the inferior vena cava. The aortic pressure dropped as soon as the pulmonary artery was plugged; the left heart continued to beat for several minutes, but, receiving no blood, could not maintain the circulation. The respirations slowed, weakened and stopped coincident with the failing circulation. The late respiratory gasps occur after the aortic circulation has failed. *Cf.* Fig. 5.

but not expelling. The hyperpnœic breathing gradually diminished in amplitude until respirations ceased, usually about 3 minutes from the time the clot was introduced.

The observations made in the fatal cases of experimental embolism, which were conducted before graphic records were taken of the events, were substantiated in detail by the kymographic records of the above experiments. The sequence of events following the introduction of the clot into the circulation did not suggest that any reflex mechanism was involved in the production of this type of death in dogs.

(c) *Effect of embolism following vagotomy.*—If any vagal reflex were involved in the cases just described, then death might be much harder to produce with the vagi cut. To this end ex-

periments were conducted to determine the effect of embolism following vagotomy.

In each of a series of four animals the vagi were cut and a large clot (14 x 0.8 cm.) introduced. In two death was not produced, even when a second or third clot was introduced. These cases were under observation, on the table, for one hour, then killed and autopsied. They displayed very extensive peripheral plugging, and in one case, No. 24 (see Fig. 5), clots were

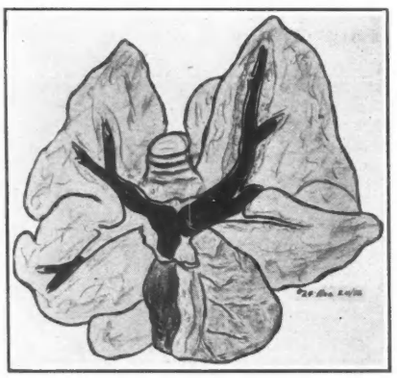


FIG. 5

found in the whole of the pulmonary artery, and the branches seemed absolutely filled. However, the record showed only a slight temporary fall in aortic blood-pressure as each clot was added. The records showed the pressure, rate and output per beat to be unaltered, so even with such apparent extensive blockage there was not sufficient change in the degree of circulation to cause much disturbance. In a rather small dog (weight 6 kg.), we introduced, following vagotomy, a clot (19 x 0.6 cm.). In 35 seconds the blood-pressure had fallen to zero and death occurred in exactly the same way as in those with intact vagi. Equally sudden death was produced in the fourth dog. Thus we established that vagotomy did not prevent the same sequence of events occurring, as with intact vagi, when a clot of sufficient size was introduced into the venous circulation of the dog.

The results obtained in the experiments up to this point did not confirm the original idea regarding the reflex response and its inhibiting effect upon the respiratory or cardiac centres. It was therefore decided to try the effect of stimulating the pulmonary artery, first, on the external surface, with a minimal faradic current, and second, on the intimal lining by means of (a) a minimal faradic current, and (b) distension of the artery with and without occlusion.

PHASE IV.

STIMULATION OF PULMONARY ARTERY

In this group of experiments the following operative technique was employed with satisfactory results.

The dog was placed under ether anæsthesia and by a mid-line incision the vagi the left common carotid artery, the right external jugular vein and the trachea were exposed. Cannulæ were inserted into the carotid artery and trachea. The blood-pressure recorder was connected to the carotid cannula and aortic blood-pressure records were then taken. This enabled us to follow the blood-pressure, pulse and general condition of the dog throughout the rest of the operation.

A thoracic mid-line incision was made extending from above the sterno-clavicular juncture to the xiphoid. The skin and adipose tissue were reflected laterally. A large aneurysm needle was then passed between the first and second ribs about 2 cm. from the mid-line. Forcing this around under the sternum and through the anterior chest wall again, we were able, usually, to tie off the internal mammary arteries, which, if not ligated, interfered seriously with the success of the operation. Another ligature was passed around the sternum between the 5th and 6th rib. This prevented the loss of considerable venous blood. The pectoral muscles were reflected laterally and artificial respiration through the tracheal cannula was then commenced. With a pair of thin, fine, sharp bone forceps the sternum and anterior one-third of the 2nd, 3rd, 4th and 5th ribs were removed intact. The intercostal arteries and the artery to the thymus were tied off; part of the thymus was removed; the pericardium was opened longitudinally, and the reflected edges were sutured around to the cut edges of the thoracic wall. The heart and pulmonary artery were thus exposed for further study. No deaths occurred during the operative procedure using this technique.

1. *Electrical stimulation of external surface of pulmonary artery.*—A faradic current, just sufficient to cause stimulation of the vagus nerve in the same animal, was used as a minimal stimulus. In a series of five dogs the external surface of the main pulmonary artery, the bifurcation, the left and right pulmonary artery, proximal and at the hilus, and within and without the pericardium were stimulated on the ventral and lateral aspects with a minimal faradic current without causing any change in aortic blood-pressure or in action of the auricle or ventricle, as indicated by a myocardiographic record. In four of the animals pulmonary arterial blood-pressure records were also taken; no changes were noticed on stimulation. Using a progressively stronger current did not produce any noticeable effect. We were unable to stimulate the external surface of the pulmonary artery on its dorsal aspect.

2. *Stimulation of the intimal surface of pulmonary artery.—(a) With a faradic current.*—Following the stimulation of the external surface of the pulmonary artery, stimulation of the

tunica intima was carried out in the same animals in the following way.

A pulmonary arterial cannula, as described by Prof. Sharpey-Schafer,[13] was fitted with electrodes. At first we used one set, and later two sets of well-insulated fine wires which were securely tied to the cannula at right angles to the T arms. The ends towards the tip were bared and turned inwards into the lumen of the cannula. The whole of the lower part of the electrode cannula, except the bared tips of the wires, was covered with a duco shellac to further insulate and to minimize the adhesion of fibrin to the wires and threads.

A purse-string suture was made on the right ventricle, an incision made in the heart, the cannula thrust in until its tip, pushed through the semilunar valve orifice, rested at the bifurcation of the pulmonary artery, and the purse-string was tightened about its constriction. In this way practically no blood was lost and the effect upon the general condition and blood-pressure of the dog was negligible. The valve cusps, fitting snugly against the cannula, allowed the escape of blood from the right ventricle during systole, and closed without incompetence during diastole. The cannula, filled with half-saturated sodium bicarbonate solution, was connected to a water manometer and Ellis piston-recorder; the plunger was withdrawn and the pulmonary blood-pressure recorded on the kymograph.

In all but the first experiment of this series, heparin solution was injected into the exposed right external jugular vein before the cannula was introduced. Thus, with the use of this double T-tube connection, pulmonary pressure records were obtained without interference from clots. Stimulation was carried out with a slightly greater than minimal current (secondary at 6 cm. from primary). The dorsal and ventral surfaces of the intima of the main pulmonary artery, the bifurcation and the right and left pulmonary arteries immediately beyond the bifurcation were stimulated in each of a series of four dogs and one rabbit. Stimulation of the dorsal wall in three of the dogs, and of the ventral wall in two, produced typical vagus effects. The heart beats became slow, or feeble, or completely inhibited. The blood-pressure fell in proportion to the inhibition. Long-continued stimulation resulted in vagus escape effects. Stimulation after vagotomy gave typical inhibitory effects.

These experiments seemed, on first examination, to support the view that irritation of the intima of the pulmonary artery might be followed by reflex cardiac inhibition and death. What is more probable, though, is that the effects were merely due to spread of the stimulus through the arterial wall to the cardiac plexus. This is supported by the inhibition obtained from the vagotomized animal, in which the efferent fibres of the vagus must have been excited, and by the fatal ventricular fibrillation caused in two cases when the main pulmonary artery was stimulated and the stimulus spread to the myocardium.

(b) *Distension of the pulmonary arterial wall.*—The results obtained from the introduction of prepared blood clots into the venous system and those obtained from the stimulation of the external and intimal surfaces of the pulmonary artery by means of minimal faradic currents have pointed continually to the absence of any reflex mechanism being involved in the production of death from pulmonary embolism. Considering again the clinical aspect of the condition with the possibility of distension of the pulmonary artery by a large embolus, we were led to continue our original plan of stimulating the intimal surface by producing distension of the arterial wall. If the death following pulmonary embolism is due to a reflex originating in the pulmonary artery, the stimulus would probably be the stretching of the wall, due to the rhythmic systolic impact on the lodged embolus. The experiments which follow, then, seemed to us a more reasonable method of investigation. Two methods were considered: (1) by distension of the arterial wall, at the same time occluding the lumen; (2) by distension without occlusion.

1. *Distension with occlusion.*—For this experiment we used a thin rubber cot, about the diameter of a main branch of the pulmonary artery, which was tied on the tip of the pulmonary cannula. The cannula was connected as before to a water manometer and piston-recorder, and as well to a rubber bulb, filled with water for raising and lowering the pressure. We were thus able to record direct values of the pressure within the cot, and to regulate the distension. The animals were prepared in the manner already described, except that a median sternal saw-cut was performed and the sternum and anterior one-third of the ribs removed in two pieces. It was found that less blood was lost using this technique, because it was possible, in those cases in which the internal mammary arteries were difficult to tie off, to open the thorax from the mid-line and clamp the arteries underneath with forceps.

With the free end of the cot inverted in the cannula tip, the cannula was introduced as before and the tip directed to the bifurcation

of the artery. The pressure was increased to about 25 cm. of water, distending the cot and driving it into the left pulmonary artery. (The normal pulmonary arterial pressure under experimental conditions was from 17 to 35 cm. of water). The pressure in the cot was now increased to 30 - 35 - 40 - 45 - 50 cm. without

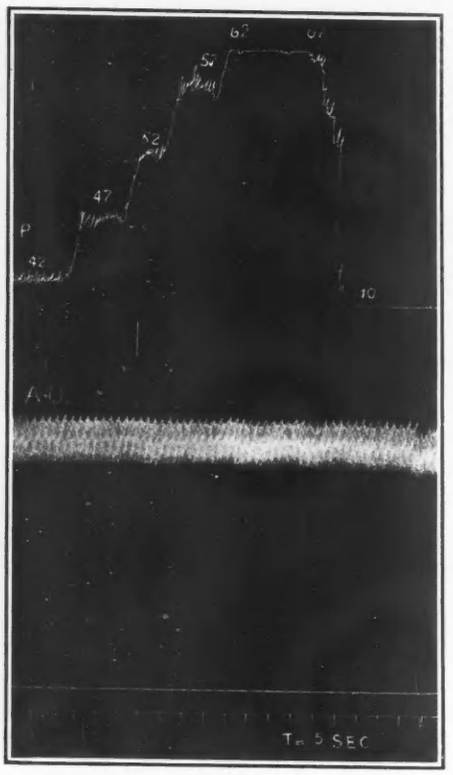
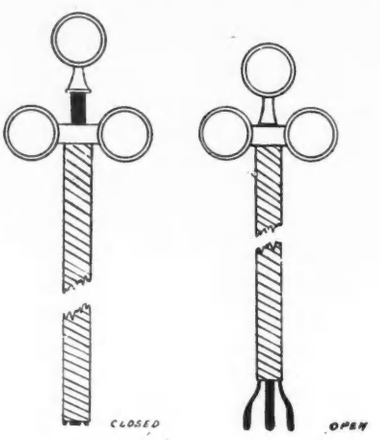


CHART IV.—Dog, 7.5 Kg. ♂ Ether. Effect of distension of left pulmonary artery, with occlusion. The upper record is of the pressure within the rubber cot in the pulmonary artery expressed in cm. of water, the second of aortic blood-pressure, and the last, the time in 5 second intervals. The pulse pressure is added to the pressure of distension with each heart beat. There is no change in aortic pressure or heart rate when the pulmonary artery is distended at pressures between 10 and 67 cm. of water.

affecting the heart rate or force or the arterial blood-pressure. No change was recorded when the pressure was reduced from 50 cm. to 10 cm. The pressure was gradually raised to 125 cm. of water without effects. It was noticeable that each systole of the heart caused a corresponding increase in pressure in the cot, so that there were rhythmic pressure changes at the new high level.

In repeated experiments of this type on three dogs, (Chart IV), we were unable to affect the aortic blood-pressure, the rate of the heart or output per beat. At the point of distension the arterial wall was stretched and felt to be under considerable tension, so we were of the opinion that occlusion of that branch of the artery had been produced. There was absolutely no suggestion of cardiac inhibition during the periods of pulmonary artery distension.

2. *Distension without occlusion.*—In order to accomplish this type of experiment, several arrangements were attempted, such as springs, hollow fibrin plugs and catheter dilators, but none were quite applicable. Finally, a type of spring-leaf dilator was made which suited our purpose admirably. This was made from a catheter with a stilette. On the end of the stilette three spring leaves were fastened so that when the stilette was drawn out, the leaves were pulled into the tubing; when pushed out the leaves dilated but did not cause occlusion (see diagram). This was introduced into the



SPRING DILATOR SET

pulmonary artery in the same manner as the cannula. This type of dilator was used in nine different experiments on three animals. Dilatation of the left and right branches and of the main trunk did not cause any change in the aortic blood-pressure nor in the rate nor output per beat of the heart.

Asphyxial death.—In order to show that the death from embolism in the dog is not of the asphyxial type records of respiration and aortic blood-pressure were taken from a dog, as the animal was asphyxiated by plugging the tracheal cannula. It will be noticed that (Chart V) the blood-pressure is elevated and maintained for the period (2 minutes, 15 seconds) of the hyperpnœa, and takes 4 minutes and 30 seconds more to reach the zero

CHART V.—Dog, ♀ Ether. Effect of asphyxia on aortic blood-pressure and respirations. The upper record, "AO" is of aortic blood-pressure, the second "RESP." of respirations, and the last, the time in 5 second intervals. The plugging of the tracheal cannula causes violent and rapid respirations which slowly decline as the respiratory centre becomes exhausted or depressed by the high carbon dioxide content of the blood. The blood-pressure is slightly elevated, and remains high for more than a minute after the respirations have ceased. The late respiratory gasps occur before the systemic circulation has failed. Cf. Fig. 3.

level, while with fatal embolism (Chart III) the aortic blood-pressure falls immediately after the clot is lodged, and has reached zero within 1 minute and 30 seconds. In the asphyxia the respirations are violent and rapid at first, gradually weakening and slowing as the excited respiratory centre becomes exhausted. In fatal embolism there is no respiratory excitement, the movements gently subside and stop in less than a minute; with the cessation of the systemic circulation the respiratory centre languishes for lack of carbon dioxide. The late gasps are common to both.

DISCUSSION

Death in man is said to follow plugging of a main branch of the pulmonary artery, *i.e.*, without sufficient obstruction to suspend the circulation through the other lung. This observation is not paralleled by our experiments on dogs. It may be inferred that either (a) death in man is accomplished by some nervous or other mechanism not found in the dog, or (b) the autopsy examinations of fatal cases in man have not included a careful inspection of the cavity of the right ventricle for clots which may have plugged the pulmonary orifice. The pulmonary artery in man is invested with fibres belonging to the cardiac plexus just as we have shown in the dog and rabbit. We have not been able to demonstrate that plugging or distension of a main branch of the pulmonary artery in the dog can produce any effects upon the heart or medullary centres through nervous channels, even though the pulmonary arterial pressure be increased to four times the normal. It seems reasonable to expect that if the plugging of a main branch could produce a reflex death in man, mild effects, at least, should be provoked in the dog by the methods we used.

It is quite obvious that in the dog the fall in aortic blood-pressure following embolism is due to failure of the left heart to receive blood, and the few late respiratory gasps are a consequence of an anæmia of the medulla, not of a stimulation by arterial blood rich in carbon dioxide. In other words, total plugging of the main pulmonary artery produces a condition of sudden great "shock", with equally sudden death. Except for the symptoms of pain and anxiety, this is a replica of the condition in man. It is manifestly difficult to detect these symptoms or their equivalent in the dog. Assuming, however, that sudden death has followed

obstruction of a main branch only, we must look for the possibility of myocardial failure. Fatal pulmonary embolism usually occurs after the fourth decade, and a damaged myocardium is frequently found at autopsy. Considering the very considerable elevation in pulmonary arterial pressure which we have shown to follow clamping of a main branch in the dog and rabbit, it follows that embolic obstruction of such a branch would throw a sudden and considerable strain upon the right ventricle. A degenerate myocardium might not be able to stand this, and death would again follow failure of the left heart to receive and expel blood. In our experiments upon dogs, we were dealing with healthy animals with good myocardia. It might be well to attempt such experiments after previously damaging the heart muscle. Spilsbury[18] accepts the view that sudden death is due to the mechanical effects of either the strain on the right heart or the failure of filling of the left heart.

In a similar way, from the results of our experiments in clamping off different lobes of the lung, we would assume that the effect on the heart of a lobectomy would be confined to the right side. This strain should be borne by a heart with ordinary reserve powers. The high mortality following this operation is likely due to the very poor myocardial or other condition of the patient before radical lobectomy was performed. When we introduced large physiological clots into the jugular vein of dogs, it was not uncommon to find some of these broken up and entangled in the chordæ tendineæ of the right ventricle. Quite frequently the autopsy, conducted immediately after death from a large embolus, showed the entire blood content of the right ventricle to be clotted about the nucleus of the foreign clot. It became a problem indeed, to decide what was experimental embolus and how much was post-mortem clot, so that we later made a practice of giving the dog heparin before introducing thrombi.

This experience suggested the possibility, however, that many emboli in man may plug the pulmonary orifice without leaving the right ventricle, cause death by obstruction, and be incorporated in what may be regarded as post-mortem clot, while death may be attributed to smaller emboli lodged further along in a branch of the artery.

Summary and Conclusions

The experiments described justify the following conclusions with respect to the pulmonary artery of the dog.

1. Clamping a main branch of the pulmonary artery raises the pulmonary arterial pressure without any reflex inhibition of the heart. The aortic pressure falls for a brief time, but is quickly restored to normal; while the pulmonary rise lasts as long as the obstruction.

2. The main pulmonary artery may be compressed to 75 per cent occlusion without causing death.

3. Total occlusion of the main pulmonary artery causes death. Release of the ligature within 93 seconds is followed by recovery.

4. Distension of a main branch, with total occlusion, at pressures up to four times the normal, does not produce death or any reflex referable to the heart.

5. Distension of a main branch or of the main artery without occlusion does not cause death or any cardiac reflex.

6. Plugging of a main branch with embolus does not cause death.

7. Plugging of most of the peripheral branches does not cause death.

8. Plugging of the main pulmonary artery, or of the valve orifice, causes sudden death, due to purely mechanical effects.

The theory that death from pulmonary embolism is due to reflex effects is not supported by experiments on the dog.

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THE OPERATIVE TREATMENT OF SPONTANEOUS INTRACEREBRAL HÆMORRHAGE*

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INTRACEREBRAL hæmorrhage is usually considered a fatal condition. The lesser "strokes" have been shown to be due to recurring thromboses of a cerebral vessel (Cadwalader[1]). These smaller accidents may be eventually followed by the hæmorrhage which proves to be fatal. It seems likely that most hæmorrhages take place in previously affected areas of softening (Globus and Strauss[2]).

The right of the aged and the hypertensive to die from apoplectic stroke undisturbed has been unchallenged for a very long time. I was led to question this right by accident. Several years ago a woman of 50 years, suffering from hypertension, fell downstairs and struck her head at the bottom of the flight. There was transient loss of consciousness. Dr. C. B. Keenan asked me to see her, but recognizing that she had an intracerebral hæmorrhage rather than an extracerebral one, I waited, but eventually operated when her condition became desperate. Within the temporal lobe was a clot which extended into the brain and which I drained. The patient died in a few days, but without further hæmorrhage.

On reconsidering this case certain things were evident. First, the hæmorrhage was similar in position and extent to that which often occurs in spontaneous apoplexy; secondly, had I been more prompt and evacuated the clot early her life would probably have been saved. It was natural, therefore, to turn one's attention to radical interference in spontaneous intracerebral hæmorrhage. The two cases to be reported below represent a tentative approach to the problem.

CASE 1

W.C., a boy aged 14 was referred to me by Dr. H. B. Cushing, of Montreal, with the story that after smoking a pipe of tobacco, his first pipe, he became nauseated and vomited violently. He lay down and twenty minutes later became unconscious. The following morning he regained consciousness, but could

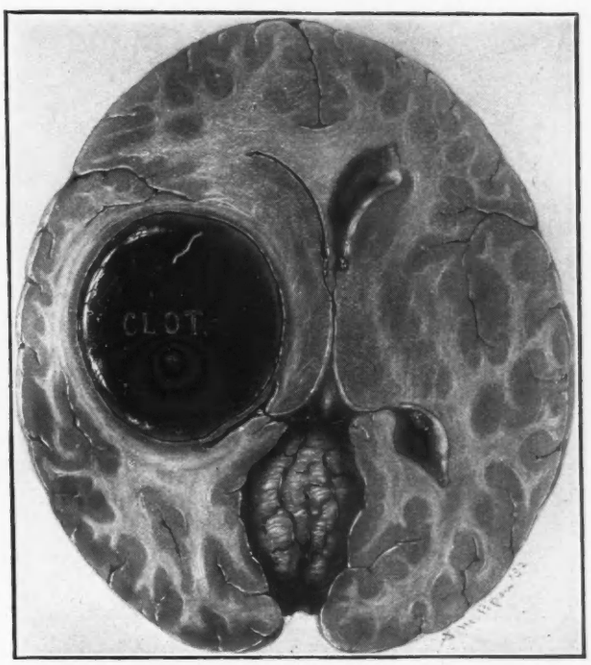

FIG. 1.—An imaginary horizontal section through the brain to show the situation of the clot in Case 1.

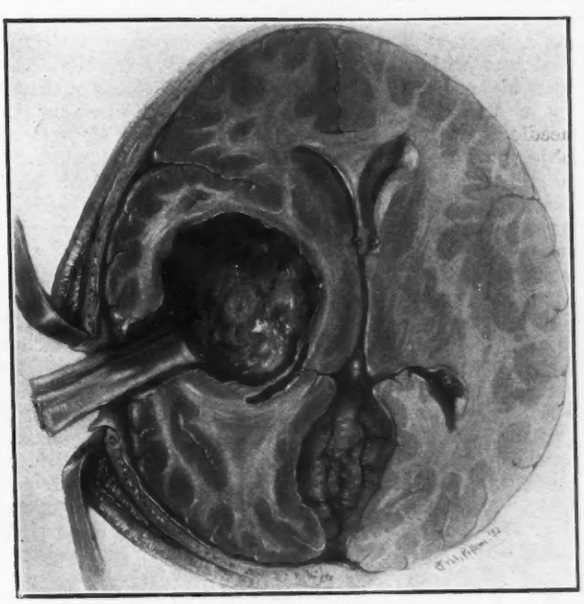

FIG. 2.—Evacuation of the intracerebral blood clot, showing insertion of rubber tissue drain.

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not speak and was paralysed all down the right side. During the night he had about ten attacks of trembling, which were called "chills," and which lasted from fifteen to twenty minutes each. Five days later when I first saw him he seemed to understand, but could not speak. The right hemiplegia was almost complete. Babinski's response was positive on both sides and the deep reflexes were increased on the right. Lumbar puncture showed the cerebrospinal fluid to be diffusely blood-tinged. He had previously been a healthy schoolboy without a history of serious illness.

A diagnosis of intracerebral hæmorrhage was made and a left subtemporal craniotomy carried out immediately under local anæsthesia. The dura, which was under moderately increased pressure, was opened. The

FIG. 3.—Ventriculogram showing ventricles displaced across the midline by the expanding intracerebral clot (Case 2).

temporal lobe showed no abnormality aside from the pressure. A hollow exploratory needle was introduced. At a depth of 3 cm. it encountered increased resistance and was withdrawn. The needle was then introduced at a higher level and entered the ventricle, as evidenced by a flow of cerebrospinal fluid. Withdrawing the needle again I introduced it into the underlying resistant object. There was no escape of fluid but when the needle was removed a small fragment of old black blood clot was found in its hollow end. An incision was therefore made in the temporal lobe, and after introducing retractors a large clot of blood (Fig. 1) was exposed and removed. The cavity which was surrounded by smooth cerebral white matter was washed out, a rubber tissue drain inserted (Fig. 2) and the wound closed about it. There was drainage of a moderate amount of blood-stained cerebrospinal fluid for forty-eight hours, at the end of which time the drain was removed and the wound healed without incident.

Improvement was immediate. A week after operation the patient was able to name ordinary objects, could read, and could move his right hand and foot a little. Eighteen months have elapsed now since operation. He has recovered completely, except for the right hand, which still shows a partial residual paralysis.

No cause for the hæmorrhage was discovered other than the violence of the vomiting. His blood pressure was 128/56. There was no evidence of nephritis and his Wassermann test was negative. Had we operated sooner the residual paresis of the right hand might well have been prevented. It is obvious that the clot was not fluid enough to have been evacuated through a hollow needle. It also seems evident that without evacuation of the clot the residual disability would have been much greater, even if he had survived, which seems unlikely.

FIG. 4.—Ventriculogram. A lateral view, taken with occiput uppermost. The upper shadow is in the right lateral ventricle, showing a normal posterior horn. The small shadow is oxygen in the left lateral ventricle unable to pass further posteriorly because of the blood clot in the right occipital lobe (Case 2).

CASE 2

E.C., a woman of 40 years, had been a patient of Dr. W. A. Murray, of Montreal, suffering from hypertension for four years. She had complained of occasional generalized headaches for a year or two, but otherwise lived an active, happy life.

One day while shopping she suddenly became dizzy and complained of diplopia. On returning home she developed violent headache, nausea and vomiting. Six hours after onset Dr. Murray found her drowsy and with a stiff neck. During the next three days the headache continued and she complained of right hemianæsthesia and hemiparesis. On the fourth day she became partially aphasic. On the sixth day she had four convulsions which became generalized after preliminary deviation of the eyes to the right. She was found to have a complete right homonymous hemianopsia and early papillœdema.

After consultation with Dr. A. H. Gordon, I was asked to see her because of increasing evidence of increased intracranial pressure. Lumbar puncture showed a pressure of 290 mm. of water, and the fluid was deep yellow in colour. From the sixth to the eighteenth day the hemiparesis gradually cleared, but the headache persisted, the papillœdema increased, her vision failed rapidly to 15/100 in each eye, and the visual fields con-

tracted. On the eighteenth day a ventriculogram was carried out. The x-ray plates showed the ventricles to be displaced from left to right (Fig. 3). In lateral views, taken with the occiput uppermost, the tip of the right posterior horn filled normally, but the bubble of oxygen in the other ventricle was blocked from entering the left posterior horn at a point 4 or 5 cm. farther anterior (Fig. 4). Operation was decided upon, with a diagnosis of intracerebral hæmorrhage in the left occipital lobe.

Left posterior osteoplastic craniotomy was carried out in the evening following the taking of the ventriculogram. The intradural pressure was greatly increased and the convolutions in the occipital lobe were widened

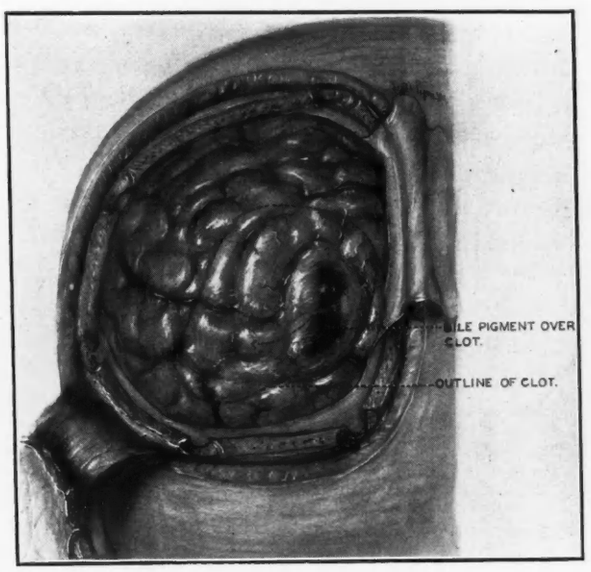

FIG. 5.—Exposure of left occipital lobe. The dotted lines indicate the extent of the blood clot beneath the cortex (Case 2).

and flattened. Beneath a bile-stained patch of cortex (Fig. 5) was a clot the size and shape of a large lemon. It extended from just beneath the pia to the wall of the ventricle, which it displaced but did not enter (Fig. 6). The clot was solid and could be easily removed through a cortical incision.

Drains were placed in the bed of the clot and after an unusually trying effort to stop all oozing from multiple small arteries in the dura and bone, the flap was replaced and the incision closed. Five days later, because of continued evidence of increased intracranial pressure, the osteoplastic flap was re-elevated in the belief that there had been a post-operative hæmorrhage. The bed of the previous clot was quite clear; there was moderate clot outside the dura, but the chief source of pressure was evidently brain œdema.

Following these operative procedures the patient rapidly recovered, except for the hemianopsia. Six months later she was at home well and happy, with practically normal vision, when she suddenly called to her husband, became cyanosed and then unconscious. In about two hours she was dead. No examination was obtained so we do not know whether the end came as a result of a cardiac accident or a second cerebral hæmorrhage.

The operation, therefore, only spared her for six months of life, but they were for the most part happy ones. The clot, being solid, could not have been removed in any way except by radical operation. Her continued essential hypertension made such a sudden termination possible at any time, of course.

DISCUSSION

Years ago Wernicke suggested that trepanation might be carried out in "ingravescent apoplexy," by which he meant those cases in which hæmorrhage produces a slowly deepening stupor that ends in coma and death. Stadelmann and Lewandowsky (see Kron and Mintz[3]), punctured in a case of apoplexy with rising pressure and removed 60 c.c. of fluid blood with a successful outcome. Kron and Mintz[3] operated upon a patient with a small hæmorrhage in the

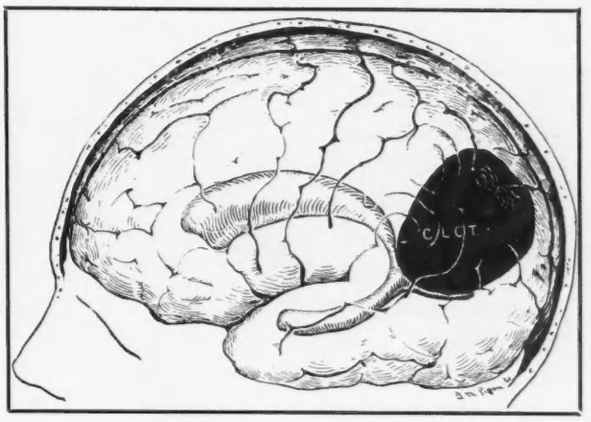

FIG. 6.—Schema to indicate extent of the blood clot (Case 2).

cerebellum, which they stated was a case of simple apoplexy. Naffziger and Jones[4] have recently reported three cases of late traumatic epilepsy in which they operated successfully. Two of the clots they irrigated out; the third was evacuated and drained somewhat as described here. In the discussion which followed this paper Rand suggested that spontaneous hæmorrhages might also be treated in the same way.

When possible it might be well to aspirate a clot as the operative procedure is so much less, but in these cases it was not possible. In the first case the clot was so solid at the end of five days that it gave solid resistance to an exploring needle, and the portion which came away in the needle's end was of firm consistency. Similarly in Case 2, after eighteen days, the clot was firm.

Apoplexy, though it may be fatal, is not a cause of sudden death, as was pointed out by Spiller[5] (MacKay[6]). Winkelmann and Eckel[7] found in their investigation of 30 cases of fatal

cerebral hæmorrhage that the shortest duration of life after the accident was one hour; this was in a case of pontine hæmorrhage. The four other pontine cases in the series survived two, three and six hours and two days respectively. The remaining cases survived for from five hours to fifteen days. In general, the next most rapidly fatal hæmorrhages are those occurring into the ventricles. The more slowly fatal hæmorrhages occur into the substance of the cerebral hemisphere, where they may be temporarily encapsulated (Robinson[8]), or on very rare occasions permanently so (Douglas[9]).

The clot is always large. Out of Cadwalader's 72 cases only 4 were smaller than 4 cm. in diameter. The more favourable and operable ones do not die early, so that opportunity does present itself for interference over a period of days or even weeks.

It is not always easy to distinguish hæmorrhage from thrombosis, but ordinarily the differentiation is clear. A sudden onset with rapid and persistent coma, or a slowly advancing stupor ending in coma, indicates hæmorrhage. In the above cases the intracranial pressure was much elevated and the spinal fluid was xanthochromic, although the clots themselves were strictly intracerebral. If the differentiation of hæmorrhage from thrombosis becomes a problem, or if localization is difficult, I can see no objection to a ventriculogram to make certain of the diagnosis, provided operation, if indicated, follows immediately after.

For the time being the place of surgery in the treatment of intracerebral hæmorrhage must be a very small one. But with careful study and selection of cases it may be possible to do something for a larger number. The relief will usually be only temporary, but after all some of the most welcome manœuvres in the field of medicine serve but to postpone an evil day.

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PRE-MENSTRUAL STERILITY AND FAMILY RESTRICTION.—K. Ogino summarizes the evidence on which he concludes that in a woman with a twenty-eight-day menstrual cycle the eleven days preceding menstruation constitute a period of sterility. A similar conclusion has been reached independently by Knaus, and both have recommended its application for the purpose of voluntary restriction of conception, when desired, during marriage. According to Ogino, in a menstrual cycle of any duration the period of ovulation consists of five days from the sixteenth to the twelfth day before menstruation: the nineteenth to twelfth days (that is, the ovulation period plus the three preceding days, allowance being made for three days' survival of fertility of the spermatozoon) constitute the period of conception. From the twenty-fourth to the twentieth day preceding the menses conception is possible in very rare instances; from the eleventh day preceding, up to the time of the menses, sterility is certain. Ogino's evidence, briefly, is as follows. In fourteen pregnancies following a known date of conception, that date never fell within the eleven days after the ovulation period; these days always proved sterile in 242 coituses practised during five marriages which were observed for nearly ten years. None of thirty-nine women who married during the days following the ovulation period, yet became pregnant within three months after marriage, conceived before having one post-nuptial menstruation; and seventeen women who became pregnant without menstruating after marriage, were found to have married during or before the sixteenth to twelfth days of the cycle. In the practical application of his findings, Ogino advises patients who desire to restrict their fertility without recourse to abstinence or anti-conceptional measures, that the tenth to seventeenth days after menstruation are those of probable conception, and the days after the seventeenth those of sterility. It is admitted that the utility of the advice is diminished in those women (possibly about 50 per cent) whose menstrual cycle varies considerably in duration from time to time. For example, in a woman with minimal or maximal cycles of twenty-six to thirty-six days, the conception period might extend from the eighth to twenty-fifth day, so that immediately before a minimal cycle the pre-menstrual sterility period is reduced to one day only.—*Zentralbl. f. Gynäk.*, March 19, 1932, p. 721. Abs. in *Brit. M. J.*

HARE-LIP

BY H. O. FOUCAR, B.A., M.D.,

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ONE of the major trials in life visits the parents on the arrival of an infant afflicted with a congenital facial deformity, to say nothing of the tremendous handicap under which the individual himself must labour with such a deformity. The ideas of its genesis and surgical management have slowly developed, until now it is possible in a large measure to relieve this unsightly condition. The percentage of failures in obtaining a pleasing cosmetic result is being lowered as we learn to divide the deformity into its component parts and care for each unit separately. While we cannot attain absolute perfection we can hope in the majority of cases to rehabilitate the patient by one or more operations and make him a presentable member of society.

These congenital facial deformities are due to a faulty development and union of the mandibular, maxillary and fronto-nasal processes. We are disregarding the palate in this discussion. According to Sir Arthur Keith,[1] these processes begin to spring from the base of the primitive cerebral capsule towards the end of the fourth week of fetal life, and by the end of the second month have completely united to form the facial part of the head. It is obvious that the effect of maternal impressions, so often considered by the laity as the cause of this defect, may be disregarded, for the face should be completely formed long before the occurrence of the suspected incidents. All that can be said definitely is that certain unit-structures of the face have failed to develop. Some contend that this is due to noxious influences such as the nutritional state of the mother, syphilis, etc. While the majority of these cases occur in poor families and present themselves at public clinics, there does not seem to be any one factor in all family histories, many parents being young and healthy and having other normal children. To say that the deformity is the result of a defect in the blood supply or nerve supply is merely putting off the question. The proponents of human heredity, according to Macklin,[2] believe that the factor for hare-lip is a recessive characteristic with modifying factors and that this defect is truly hereditary, but that only the marked examples are commonly recognized. The lesser degrees (a slight notch of the vermilion border, a notch of the alveolar border, a small or absent lateral incisor tooth or a bifid uvula) may pass unnoticed by the laity or the average medical examiner, or there may have been a miscarriage of an affected fetus, all of which materially modifies the statistical study of this group. Cryer[3] suggests a purely mechanical factor. The mandible develops first, and pressure upwards, due to increased flexion of the head, may prevent fusion of the maxillary and fronto-nasal processes.

It is well to emphasize that we are dealing with defects in unit structures of the face which may or may not be associated with defects in other unit-structures of the body. We are not justified in concluding that because the infant has a gross facial defect he is also mentally defective and that no attempt should be made at salvaging him. This sentiment is constantly voiced by otherwise able men, but it is unfair to the individual and to his family. Even if the child does happen to be mentally defective, which occurs in only a small percentage of cases, there is no reason why he should not be made to look human, if only for the sake of the rest of the family. It is surprising how much the average patient improves physically and mentally, or, shall we say, psychologically, after reparative procedures. The presence of an extensive cleft militates against the child's survival, due to interference with nutrition and increased susceptibility to respiratory infection. The presence of any uncorrected deformity hinders the older individual from taking his

proper place in society, while the more extensive varieties may force him from the economic race and even render him a charge on his family or on the community. Fortunately, the majority of patients are males, for even a faulty repair may often be camouflaged by a moustache.

As a result of the faulty union of the two mandibular processes a median cleft of the lower lip and even mandible results. This is rarely seen, however. Excessive union between the maxillary and mandibular processes results in microstoma and the reverse in macrostoma. Faulty union between the maxillary and the fronto-nasal processes accounts for the oblique facial scar, groove or cleft. The commonest facial defects have to do with the faulty development and union of the medial fronto-nasal and maxillary processes, resulting in hare-lip. This may be unilateral or bilateral, and may vary from simple notching to a complete cleft into the floor of the nose, and it may or may not be associated with defects in dentition, in the alveolar ridge, in the soft and the hard palate. More rarely the premaxilla, prolabium and columella may be absent, resulting in a median cleft.

In studying the patient, the alæ nasi, the tip of the nose, the columella, the position of the nose relative to the midline of the face, the depth and width of the cleft, the amount of lip and of the vermilion border, the width of the alveolar cleft, if present, the state of dentition, the amount of prolabium, and the position of the premaxilla are considered. Few realize how frequently the defect in the nostril occurs. even in cases of simple notching. The nose may be flattened, the tip displaced, the axis of the nostril oblique or even transverse and it may lie posteriorly to the other one, and the columella may be out of alignment. For a satisfactory cosmetic effect it is essential not to overlook this, for uncorrected it may result in an unsightly deformity of the nose which is more difficult to remedy later in life.

The only treatment of hare-lip is surgical, with assistance in some cases from the dentist. It is usually easier to plan an operation for an untouched case than to patch one that has been handled on faulty principles. Merely to get a closure is not a sufficient standard. The object of the operation primarily is to improve the appearance of the patient, and is successful only in so far as the case approximates normal. Unless a surgeon is willing to devote considerable time and attention to minutiæ he is not doing himself or the patient justice.

When should the operation be undertaken? As early as possible. It is usually safe to repair the lip on the day of birth. There are many arguments in favour of this. The nutritional state is as good as within the next week or two. With the lip repaired the feeding problem is simplified. The deformity may be repaired before the mother ever sees it, and the child is ready to nurse in four or five days. The parents are not placed in the position of trying to hide their child from visitors. If the mother is delivered in a hospital an operation at this time saves a second or more prolonged hospitalization. The bleeding time should be taken first. After the fourth day it is wise to wait for two weeks to avoid the period of jaundice and its attendant danger of hæmorrhage. When cases present themselves later, as they usually do, it is necessary to exclude the presence of eczema, furunculosis, etc., and also of respiratory infections or the exanthemata. The patient, therefore, should be kept under observation in a hospital without visitors for three or four days before surgical treatment is attempted. During this period argyrol (10 per cent) should be instilled into the nostrils. If the nutritional state is poor, it may require long, careful nursing before operative interference can be attempted. Early operations often avoid this.

Fluids may be given freely up to within two hours of operation, and a retention enema of glucose solution is valuable. Light ether anæsthesia is satisfactory. A suction machine is essential to remove blood from the throat, even though the patient may be placed in the Rose or Trendelenburg position. During the operation some use right-angle clamps, "bull-dog" clamps, or pass a temporary suture through the angle of the lip to catch the coronary vessels. Others use digital pressure on the lip or moderate pressure with forceps to control hæmorrhage. Most surgeons merely crush the bleeding vessels with forceps. Rarely is it necessary to use a ligature. Adequate undercutting of both sides of the cheek to insure relaxation is the first step and is of prime importance. Bleeding here may

be controlled by a small pack, by pressure, or by the use of epinephrin locally.

What of the alveolar cleft or prominent premaxilla if present? These may be disregarded at this stage. Wiring operations and forceful digital pressure are unnecessary. The premaxilla should never be excised, and it is seldom necessary to cut the vomer or remove a wedge. If the lip is closed over these structures, which is possible with sufficient undercutting, the natural lip pressure will approximate the alveolar borders and pull the premaxilla down sufficiently in most cases, and give a better end result. It is true that with these other methods the closure may be easier and the immediate result more pleasing, but with the growth of the child a deformity may arise due to faulty development of the maxilla, and the upper lip may lie on a distinctly posterior plane, requiring a denture or prosthetic appliance to give a satisfactory appearance to the face. The premaxilla should lie in front of the ends of the maxillæ and not between them, holding the upper lip well forward as in the normal infant. In those cases where the premaxilla does not come down sufficiently, a wedge may be taken from the septum at the time of the operation for the repair of the palate.

The proper moulding of the alæ nasi to form a symmetrical nose is the first step in the work of reconstruction. Its importance is often overlooked, but it is essential to a satisfactory end

FIG. 1.—H., male, aged 20 months. Right incomplete hare-lip. Slight widening of the nostril with change in its axis; slight irregularity in the alveolar arch and in dentition; palate normal.

FIG. 2.—The same. Two weeks later.

FIG. 3.—G., male, aged 13 years. Left incomplete hare-lip. Widened nostril; irregular alveolar arch and dentition; palate normal. Fourteen in the family, one other member with a single complete hare-lip and cleft palate.

FIG. 4.—The same, two weeks later. Note particularly the change in psychological outlook. The teeth will be cared for later.

FIG. 5.—W., male, aged four days; weight six pounds. Complete right hare-lip and cleft palate. Wide lip and alveolar defect with marked distortion of the nose. Ulceration of the septum and inflammatory reaction in the palate. Operation delayed six weeks.

FIG. 6.—The same. As a result of lip pressure only, the alveolar edges now touch. The floor of the right nostril is still a little wide and the tip of the nose droops slightly. This has since been corrected.

FIG. 7.—A., male, aged five months. Complete double hare-lip and cleft palate; protuberant premaxilla and prolabium. Very short, almost absent, columella.

FIG. 8.—The same. By lip pressure only the premaxilla has been brought into contact with the maxillæ. The nose is still wide and flat. This will be corrected later after his palate has been repaired.

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result. Even in patients with slight notching it is surprising how often there is some degree of nasal deformity. Unless this point is emphasized its presence goes unrecognized, and the surgeon wonders why the result is not pleasing to the eye.

The incisions in the lip, with conservation of the flaps of the vermilion border, require careful consideration. There are many technical procedures, some simple and others more complicated. The modified Mirault operation[4] for single hare-lip is one of the most satisfactory. Properly executed, it results in symmetrical nostrils and a lip of normal length and not as flat as in some simpler procedures. It allows a greater fullness anteriorly which approaches more closely the contour of the normal lip. The scar line is broken so that there is less likelihood of deformity or notching due to contraction, and the vermilion border is more natural.

A retention suture passed through the nose externally on lead buttons helps to keep the alæ nasi in position until healing is complete. It is often wise to place a rubber tube or packing in the nostril for a couple of days to maintain its shape. No dressing is necessary, but a Logan bow is excellent for keeping tension off the suture line, for in this way crying does not move the upper lip. The hands should be controlled so that they cannot touch the face. The patient may be placed on his side so that the blood may trickle from the angle of the mouth and the extent of post-operative hæmorrhage may be estimated. Usually there is none, the field being dry before the patient leaves the operating room. If the lower lip is being sucked in during inspiration it means that the child is having respiratory difficulty and the lip may be held down by a nurse, pulled down by adhesive, or some type of breathing tube may give relief. The suture line should be kept dry, clean, and free from crusts. The skin sutures should be removed on the fourth day, but the retention sutures should stay in for two weeks.

The percentage in which complete failure occurs should be very low. By this is meant complete non-union. Major and minor adjustments are necessary not infrequently, particularly if we are critical of our own work. The tip of the nose may need to be lifted, a droop of the ala nasi corrected, the floor of the nose narrowed, the lip lengthened, thickened scar excised, or the vermilion border improved. The mortality rate is low. In this series of operations on hare-lip and cleft palate there have been no deaths. If space permitted, I could illustrate all gradations from simple notching, incomplete cleft, complete cleft with varying degrees of flattening of the alæ nasi, incomplete double cleft and complete double cleft with the premaxilla projecting straight forward and the prolabium arising almost from the tip of the nose. The accompanying pictures are sufficient, however, to demonstrate the common types.

SUMMARY

1. The successful treatment of hare-lip depends on a careful pre-operative analysis of the defect itself, and the proper planning of the operative procedure to fit the individual patient.

2. The defect should be analyzed into its component parts and each part corrected carefully.

3. Merely to get a closure is not a sufficient standard. The operation is successful only in so far as the final result approximates the normal.

4. Even in incomplete hare-lip deformity of the nostril may be present, and requires attention as well as the lip itself.

It gives me great pleasure to acknowledge a debt of gratitude to Drs. V. P. Blair, J. B. Brown and W. G. Hamm for the many courtesies extended to me on my visits to Barnes Hospital, St. Louis, Mo.

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NE'ER PUT THE PLOUGH AFORE THE OWSEN.—In every undertaking that which is Essential should have the first place; and the Accessory, if there is occasion for it, should be considered afterwards. Many men commence with that which is of least moment to them, and defer the consideration of those things which would be useful and profitable to a period when it is too late to reap the advantages which would accrue from them. We thus frequently see men who have no sooner begun to prosper in life than they become eclipsed, as it were, in their very success and emerge in poverty. Method is as necessary to the art to Live as to the acquirement of Knowledge.—*Richard Pigot.*

CREEPING ERUPTION, WITH SPECIAL REFERENCE TO CUTANEOUS MYIASIS AND REPORT OF A CASE

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WE shall report a case of larva migrans due to the larva of the botfly, *Gastrophilus intestinalis*. The case is of interest because of its rarity in western Canada and because of the demonstration of the larva *in toto*.

Clinical history.—J. P., a farmer, aged 29 years, was admitted to the Winnipeg General Hospital on June 30, 1932, suffering from an injury to the left eye. While in hospital he complained of an itching eruption on the flexor surface of the left forearm. The patient's description is as follows: "I first noticed it about four or five days after I was in the hospital. It looked like a mosquito bite, and was very itchy. Then in a few days

FIG. 1

it started to spread around my wrist. I noticed it always moved at night. Some nights it moved about three-quarters of an inch; on a cool night it did not travel as far as on a warm night. As it moved along, the skin healed up behind it." In his opinion the eruption was due to an insect. During the last few days he thought the insect had "backed-up."

When a clinical examination was made on July 22, 1932, the eruption presented itself as a tortuous raised and palpable dark brown linear lesion (Fig. 1). For about one inch the lesion was acutely inflamed, and presented the appearance of an herpetic eruption, five or six vesicles being grouped together. There was a narrow inflammatory zone fading into the normal epidermis at the adjacent loops of the tract.

The patient's *past history* was negative and a *general examination* revealed nothing of any significance.

On July 23, 1932, clear machine oil was applied to the affected parts, as suggested by Austmann.[1] A small black dot was seen without the aid of a magnifying glass. This was removed with the point of a needle. The organism was mounted in glycerin and photographed (Fig. 2).

DEFINITION

Cutaneous myiasis is the term applied to the presence of larvæ of Diptera (two-winged flies) in the skin or subcutaneous tissue of vertebrate animals. There are three types: (1) larva migrans or "creeping eruption"; (2) phantom tumours; (3) furunculous myiasis.

Larva migrans is a term applied to a number of human skin affections caused by the wanderings of animal parasites, which leave behind narrow, red, linear, serpiginous and inflammatory tracts, uusually accompanied by intense irritation. It is also known as creeping eruption, hyponomoderma (Kaposi), dermato-myiasis linearis migrans œstrosa (Kumberg), dermatitis linearis migrans, linea migrans, epidermiditis linearis migrans (Wolossatic), Kriechkrankheit, Hautkratzschorf, myiase hypodermique. The term "creeping eruption" is applied in reference to so many diverse conditions that it is probably better in the interest of accuracy to accept the suggestion of Kirby-Smith, Dove and White,[2] to restrict it to that condition known in the South Atlantic and gulf coast states as being due to *Ancylostoma braziliense*.

HISTORY

"Creeping eruption" was reported for the first time in 1875 by Lee,[3] an English physician. He described a peculiar reddish raised line on the abdomen of a small child. It developed a circuitous route and looped on itself. It sometimes travelled as much as four and a half inches in twenty-four hours. Dickinson, Fox and Duckworth investigated the tissues, but they were unsuccessful in finding a parasite, which was suspected to be the cause. Ten years later Lee[4] reported a second case in a man. Mention is made of a parasite being found in this one. Crocker,[5] an English dermatologist, published a third case in 1893. He believed a parasite to be the cause, but did not find one. In 1895 Neumann[6] reported the first case in Austria. The fifth case is that of a Russian investigator, V. Samson Himmelsjerna.[7] He found a Gastrophilus larva. In 1897, Sokolow[8] reported a case and stated that he had seen two or three every summer for about sixteen years. Malcolm Morris[9] reported two cases in England in 1896. Kaposi[10] reported a case in 1898. In Topsants'[11] case in 1901, a larva of *Hypoderma bovis* was found.

The first reports in American literature were made in 1903, when Von Harlingen[12] reported three cases. In the same year Stelwagon[13] reported his first case. Hamburger[14] in 1904, Shelmire[15] in 1905, Moorhead,[16] Hutchins,[17] Gosman,[18] were other United States physicians making early reports of the disease. In 1917, Gaskill,[19] Whitehouse[20] and Howard Fox[21] reported cases. In 1921 Tamura[22] published an exhaustive review and reported a case of "creeping eruption" in Japan due to a species of *Gnathostoma.* He attempted to classify the disease according to clinical manifestations. Recent investigators do not stress this phase of the matter, as various types of lesions have been observed in the same patient with multiple eruptions. Kirby-Smith, Dove and White[2, 23] have been prominent in the investigation of the disease in the United States within the past few years. They have investigated hundreds of cases. Shelmire,[24] Winter,[25] Grund,[26] Miller,[27] Montgomery[28] and others have also reported cases.

The first report in Canadian medical literature was by S. H. and C. E. Corrigan,[29] Lampman, Sask., in 1925. J. K. Pomeroy,[30] Gainsborough, Sask., reported a similar case in the same year. In 1926, K. J. Austmann[1] reported the first case in Manitoba.

GEOGRAPHICAL DISTRIBUTION

Cutaneous myiasis has been reported from England, Russia, Denmark, Hungary, Poland, Austria, Canada and the temperate zone of the United States. Marishita[31] states that creeping eruption due to *Gnathostoma* is limited to Siam, the Malay states, China and Japan, which are tropical and sub-tropical countries. Kirby-Smith, Dove and White[2, 23] state that creeping eruption due to *Ankylostoma braziliense* in the United States is "confined at present largely to coastal plains from New Jersey south and west to Texas inclusive." The disease occurs where there is sandy soil and near the sea shore or inland lakes. Cases are rare in the inland states. They found that in Florida the greatest number of cases occur in the rainy period of the hotter months. In the black mud area of the south Mississippi Valley, where sandy soil is rare, the disease was not known.

Dove[32] quotes M. C. Hall on the geographical distribution of *A. braziliense* as follows: "*Ancylostoma braziliense,* either under this name or under the name of its synonyms, *A. ceylonicum* or *A. gilsoni,* has been reported from a wide range of hosts distributed over a large part of the earth, especially in tropical and sub-tropical countries. Outside of the United States it has been reported from South America (Brazil, Dutch Guiana and Argentina), Central America (Panama), Africa, (Sierra Leone, Belgian Congo, Accra [Gold Coast], Durban and Transvaal), Asia (India, Bengal and Madras), China, Malay Peninsula and Siam, and from the islands of Sumatra, Ceylon, Java and the Philippines."

Dove states that "Reports of the occurrence of cases of creeping eruption in foreign lands apparently coincide with reports of the occurrence of *A. braziliense.*"

ETIOLOGY

It was thought at one time that larvæ of the gastrophilus genus were the only cause of creeping eruption, but in recent years it has been found that several animal parasites may be the causative organisms.

Hamilton Montgomery[28] tells us that larva migrans may be due to one of the following groups of organisms: (1) larvæ of *Gastrophilus,* the botfly, usually either *Gastrophilus intestinalis* or *Gastrophilus hæmorrhoidalis;* (2) nematodes of the pig and cat, of the genus *Gnathostoma;* (3) *Hypoderma,* the common warble-fly grubs of cattle; (4) larvæ of a hookworm of cats and dogs, *Ankylostoma braziliense;* and (5), experimentally in dogs, by the larvæ of a hookworm, *Uncinaria stenocephala;* (6) ants and mites. Presumably other organisms may be discovered in the future. Organisms of the first four groups are readily distinguished from one another by the marked morphological differences in the respective organisms, when demonstrated either alive or in sections of the skin. There is also a marked difference between them in size. *Gnathostoma* is a large nematode, about 1 cm. in length, in contrast to the *Gastrophilus* larva which, in tissues of human beings, is usually only from 1 to 2 mm. in length. *Ankylostoma braziliense* has a length of only 0.5 mm. and a maximal breadth of 20 microns. Because of its relatively small size, and because the larva may actually lie as much as from 2 to 3 cm. in advance of the microscopic end of the burrow, the *Gastrophilus* larva has been demonstrated by extraction or in sections of tissue in relatively few cases. The same holds true for *Ankylostoma braziliense.* Many of the cases reported in the literature in which the organisms was searched for and was not found may equally well have been due, in view of recent contributions, to *Ankylostoma braziliense.* This would apply particularly to those cases in which there was a history of contact with moist soil or sand and in which multiple burrows were present."

In 1927, Wright, Klauder and Hollingsworth[33] reported before the Philadelphia Dermatological Society "a raised linear serpiginous eruption in a ten-year old child. The lesion started on the sole of the left foot, running over the outer side and onto the dorsum of the foot. From the terminal portion of the lesion an organism had been removed. This was identified as an ant by Mr. W. E. Dove and by Mr. Rohrer, of the Bureau of Entomology, Washington, as *Selenopsis geminata* Fabr. var. *rufa Jerd.*"

Dove[32] reports: "Two infections of a *pseudoscabies* in Italy were studied by Casanza. He observed linear lesions of the skin and by dissecting them he was able to recover immature stages of mites. His specimens are described under a provisional name, *Dermolecaninum migrans Zavattari,* pending a discovery of the adult forms." Fülleborn[34] reports: "An intentional percutaneous infection with larvæ of *Uncinaria stenocephala* on the author's forearm caused a long narrow duct starting from the side of infection and rising above the surface of the skin; its length gradually increased. It was similar to the form of creeping eruption observed in the south of the United States, and which has recently been assumed to be caused by larvæ of nematode worms, wandering in the epithelium. The eruption in the author's case was also very much like the 'larbich,' a West-African creeping eruption, which the author believes to be caused also by a nematode larva. He cannot decide whether in his case the larvæ of *Uncinaria stenocephala* had an essential part in the etiology of the eruptions. They are not the only nematode larvæ which can cause the clinical picture of creeping eruption, even if the larvæ of *Gnathostoma* are not counted. This larva has been determined in some cases of creeping eruption in east Asia. On the other hand it may be possible that besides larvæ of the gastrophilus flies larvæ of *Uncinaria stenocephala* cause creeping eruption in Europe."

Melczer,[35] referring to creeping eruption caused by *Gastrophilus* and *Hypoderma* larvæ, reports: "The etiology of creeping disease has not been cleared. Especially the way of infection and the incubation time are problematic. It has been generally assumed that living larvæ reach the skin of individuals taking care of horses, but in the south of Russia, where nearly all the horses are infected by *Gastrophilus,* the disease is very rare in adults. Glaser's experiment showed that the larvæ of *Gastrophilus* put upon the skin could not bore into it, but dried up in a short time. In a case of Glaser's, a hypoderma larva, just creeping from the egg, was able to bore itself into the skin only after a very long time. There is no doubt that larvæ of certain gastrophili may get into the digestive tract of man, but it is hardly to be assumed that from there the parasites can wander into the skin; this would be an unusual conduct for them. It might be more reasonably expected from *Hypoderma,* but this parasite causes purulent tumours in the skin and no linear

canals. Gadflies, as stated in Sokolow's report, lay their eggs also directly on man."

In the Corrigans'[29] case report they quoted Professor A. E. Cameron, formerly of the University of Saskatchewan, as follows: "I have no hesitation in stating that your specimen is the maggot of *G. intestinalis*, probably in the first or second stage of its growth; I am very pleased that you have been able to show that the *Gastrophilus* maggots do penetrate the skin of the host directly." In Austmann's[1] case the actual measurements of the larva was 0.804 by 0.115 mm. It was also identified by Prof. A. E. Cameron as a first stage larva of *Gastrophilus intestinalis*, similar to the one in the Corrigans' case, examined in the previous year.

Symptoms and Signs

The characteristic feature of the affection is a narrow thread-like line which progresses as the parasite moves through the epidermis. The line is usually from one to four mm. in width and slightly elevated, about one-half a mm. Although one line is usually present there have been multiple lesions seen in many instances. Shelmire[24] reported a case (*Ancylostoma braziliense*) with hundreds of lesions. The sites usually affected are the uncovered parts. No case has

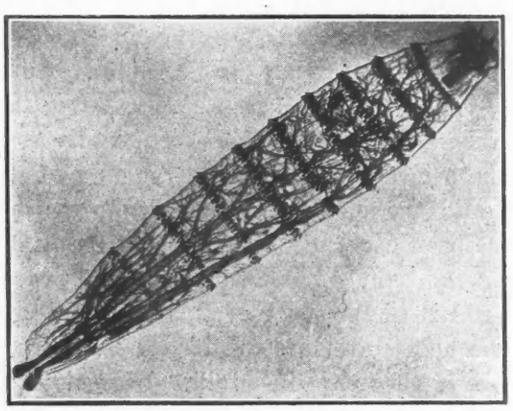

FIG. 2.—Microphotograph of the organism mounted in glycerin.

yet been reported involving the mucous membranes or the scalp. Subjectively the only symptom is itching. This may vary from slight to severe. In such cases as have had a blood count done no variation has been found either in total leucocyte count or in proportion of eosinophiles.

The Biology of Gastrophilus

The normal habitat of the larval stages of gastrophilid flies is the stomach of the horse or of other Equidæ, and the usual veterinary term for these stomach-inhabiting parasites is "bots." So far as we are aware, such larvæ have never been recorded as skin-burrowers in equine hosts. In western Canada three species of Gastrophilidæ are known, namely, *Gastrophilus nasalis L.*, *Gastrophilus intestinalis De G.*, and *Gastrophilus hæmorrhoidalis L.*

The first stage larvæ of all three species are very similar (Fig. 3) and the larvæ of the two last-named species are almost indistinguishable. Of the three authorities to whom photographs of the larva recorded here were submitted, Dr. W. A. Riley, of the University of Minnesota, was inclined to the opinion that the species concerned was *hæmorrhoidalis;* Dr. A. M. Fallis, of the Ontario Research Foundation, and Mr. W. E. Dove, of the Bureau of Entomology, United States Department of Agriculture, regarded it as *intestinalis.*

The egg.—Both *G. intestinalis* and *G. hæmorrhoidalis* lay their eggs on the hairs of the horse, those of *intestinalis* being laid on the inner surface of the forelegs, those of *hæmorrhoidalis* being laid on the lower lip or between the rami of the lower jaw. Up to 700 eggs may be laid on the horse.

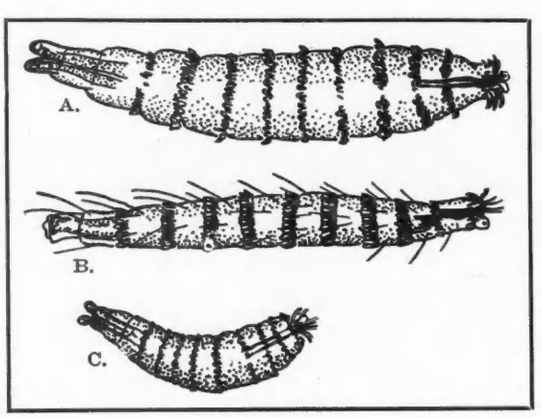

FIG. 3

(a) First stage larva of *Gastrophilus intestinalis* (equi).
(b) Same of *G. nasalis* (veterinus).
(c) Same of *G. hæmorrhoidalis.*

Drawn to the same scale.
(After W. S. Patton and A. M. Evans)

The first stage larva.—The first stage larvæ of both *intestinalis* and *hæmorrhoidalis* are fusiform in shape and pointed at either end. Thirteen segments are present. The general colour is a translucent white. In the larva of *intestinalis* the first segment bears a few recurving small hooks on its anterior margin; the

second segment has an armament of recurving spines on the anterior margin. Segments two to ten are provided similarly on their posterior margins with small spines and sub-ovate flat scales. Segments eleven, twelve, and thirteen have no spines nor scales. In the mid-dorsal and mid-ventral line there is a gap in the segmental rings of spines. From the last segment there projects a pair of fleshy processes, each containing a prolongation of the main lateral tracheal trunk of its side and bearing the posterior spiracle at its tip.

The first stage larva of *hæmorrhoidalis* is similar to *intestinalis* but the spines are weaker. The first stage larva of *G. intestinalis*, according to Fallis, is 0.866 mm. and the greatest width about 0.217 mm., whereas in the first stage of hæmorrhoidalis the length is 0.585 mm. and the greatest width 0.133 mm. The larvæ in this case measured 1.521 in length and 0.292 in greatest width.

Life history.—The eggs are usually laid in the latter half of July, and they hatch in from nine to eleven days. The larva of *intestinalis* cannot emerge without the help of friction and moisture such as is provided by the tongue of the horse. It probably emerges from the egg on the tongue of the horse, is swallowed, reaches the stomach and attaches itself to the stomach wall, living thus for eight to ten months, before passing out of the horse and entering the soil to pupate. Patton and Evans[36] assert that it is unable to penetrate the human skin and that the larva of *intestinalis* has never been found in the skin of man. The first stage of the larva of *hæmorrhoidalis*, on the contrary, emerges from the egg without the aid of friction, penetrates the skin and the lip, and, in some way not yet known, makes its way to the stomach, its subsequent career being like that of *intestinalis*.

Adult fly.—After leaving the horse, usually in the spring months, the larvæ pupate in the soil. In July the adult flies commence to emerge from the subterranean pupæ. They are large flies, somewhat hairy and resembling in appearance a bee. *Intestinalis* is brownish-yellow with black abdominal rings and 18 mm. in length; *hæmorrhoidalis* is blackish-grey, with an abdominal tip of bright orange hairs and 15 mm. in length. They do not bite, as the mouth-parts are vestigial and the excitement and fear shown by horses when such flies are in the vicinity is difficult to explain.

In the light of the facts of Gastrophilid biology outlined above, it would seem probable that in cases of creeping eruption due to gastrophilid larvæ the victim became infected when grooming or handling a horse, and not through any direct attack from an adult fly. The friction of a moist, warm human forearm upon gastrophilid eggs would undoubtedly induce rapid hatching, and the emerging larva would be capable of passing into the epidermis, via a hair follicle.

HISTO-PATHOLOGY

In Montgomery's case[28] (due to *Gastrophilus* larva) "The acute reaction which apparently develops shortly after the passage of the larva simulates the histological picture seen in erythema multiforme or in toxic dermatitis. The absence of any foreign body reaction about the larva or tunnel, or even of an inflammatory reaction in the wall of the tunnel, suggests the acute reaction is not the result of mechanical trauma on the part of the larva but rather is the response to toxic substances created by the larva."

TREATMENT

In treating the eruption due to the *Gastrophilus* larvæ it is essential that the onward course of the parasite be blocked. The obvious thing to do is the removal of the larva if it can be seen, after which the eruption gradually disappears. If the parasite cannot be located, then excision or cauterization of the active end of the lesion should be tried. The injection of one or two c.c. of a 3 or 5 per cent carbolic acid solution has been used. Freezing by means of the ethyl chloride spray and carbon dioxide snow has been advocated. As there is usually some secondary staphylococcal infection from scratching, the use of mild antiseptic applications, such as weak ammoniated mercury ointment, 2 per cent solution of mercurochrome, tincture of iodine or Dakin's solution may be necessary.

SUMMARY

A report is made of the second case of cutaneous myiasis observed in Manitoba, and due to the first stage larva of *Gastrophilus intestinalis*, together with a brief review of the literature.

"Creeping eruption" is not an etiological entity. At least seven different parasites have been found to be the cause of this skin condition.

First stage larvæ of *Gastrophilus*, the botfly, have been recovered in less than a dozen cases and reported in the literature. These cases have been found in the temperate zone of the United States, in Canada and European countries.

Larvæ from cattle grub flies also cause a "creeping eruption." Their tumours are deeper and larger than the *Gastrophilus* infections. Nematode infection due to *Gnathostoma* has been reported from the Orient.

The thousands of cases reported from the southern states have been due to *Ankylostoma braziliense*, the dog and cat hookworm, and it is considered by some that this may be the etiological factor in most of the cases reported from the tropical countries.

We desire to record our thanks to Prof. R. A. Wardle, Department of Zoology, University of Manitoba, for many helpful suggestions.

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UNUSUAL CLUES TO THE DIAGNOSIS OF TYPHOID FEVER

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AS is well known, typhoid fever, like many other diseases, does not always "play the game"; it cheats us, in that it does not always show the complete set of signs and symptoms which, the text-books assure us, a well-bred case should show; it camouflages itself so as to ape the similitude of other diseases.

The differential diagnosis between acute miliary tuberculosis, acute bacterial endocarditis and typhoid fever, to mention only a few instances, is stressed in most text-books on medicine and is well known to students: and yet, in actual practice, there are cases of typhoid fever which baffle the diagnostic acumen of the very elect. Dr. Chas. R. Box,[1] says: "In exceptional cases (of typhoid fever) pneumonia may mark and mask the onset, the attack commencing abruptly with consolidation of the lung. The true nature of the infection may be overlooked and only discovered at autopsy, or the pneumonia may subside and be replaced by the ordinary symptoms and signs of typhoid fever. This variety is known as pneumo-typhoid." This, of course, is an extreme and unusual mode of onset of typhoid fever, but the point to be stressed is that it can and does occur. Quite commonly we see a mild form of bronchitis at the onset, and it is not unusual to meet with cases in which either hypostatic congestion or pneumonia, broncho-pneumonia, or even lobar pneumonia occurs as a complication in the second or third week or later, with or without pleurisy with effusion, serous or purulent. Dr. Box[2] asserts that "When typhoid is prevalent, caution is necessary in arriving at a diagnosis of primary bronchitis, pneumonia or broncho-pneumonia"—to which may be added pleurisy.

It is not surprising then that cases of typhoid fever are not diagnosed when signs and symptoms of disease of the respiratory organs are prominent, and the typical signs and symptoms of typhoid—such as rose spots, enlargement of

the spleen, abdominal tumefaction or discomfort, etc., are absent, and the temperature chart is atypical; or the usual leucopenia of uncomplicated typhoid is, in the presence of some complication, replaced by a normal white cell count or a definite leucocytosis. To make a diagnosis in such cases is extremely difficult clinically and the aid of the bacteriologist is often not invoked, because there seems no reason to suspect typhoid at all. The point to be stressed is, that although reliable laboratory tests for typhoid fever have been available for many years yet a certain number of cases of this disease continue to go unrecognized.

The crux of the situation is this; when typhoid fever is quite unsuspected and when what is really a respiratory complication is regarded as primary, how is one to obtain a clue as to the true causative factor and so arrive at a correct diagnosis? A method of obtaining such a clue in certain cases is the "raison d'etre" of this communication. What we require is some simple examination which the physician himself may be able to make; something which may give not an actual diagnosis but a clue which may lead to a diagnosis; for, once the clue has been found, the routine laboratory tests of the blood, fæces and urine are sufficient to complete the diagnosis if adequately carried out.

It has been said "There is nothing new under the sun." The following observation may not be original; it is new to the writer and may be to a good many others; certainly no mention is made of it in any text-book that we have consulted. We refer to a very definite clue to the diagnosis of typhoid infection which the microscopical study of the cellular content of a pleural exudate may give us. We know that certain infections give rise to characteristic cellular responses. The characteristic cellular response to infection by *B. typhosus* is the large mononuclear phagocyte, probably derived from the reticulo-endothelial system, a large cell with slightly granular cytoplasm and a nucleus typically notched or kidney-shaped, and placed eccentrically. Anyone who has had the opportunity of examining a series of sections from the tissues of a known case of typhoid fever, cannot help being struck by the enormous numbers of these typical cells which abound in all tissues and organs invaded by the typhoid bacillus; the liver, spleen, kidneys, Peyer's patches, mesenteric lymph nodes, lungs, all contain them in enormous numbers in typhoid fever. Of course the large mononuclear phagocyte is not peculiar to typhoid infection. One sees precisely the same cellular response in tuberculosis and other infective granulomata; but nowhere does one see these mononuclears in such large numbers and so indiscriminately placed, without any special arrangement, along with lymphocytes, as in cases of typhoid infection. The phagocytes may equal or even exceed the lymphocytes in point of numbers. The picture seen under the microscope is quite characteristic and once seen can never be forgotten. One would expect that this characteristic cellular response in the tissues would be duplicated in any pathological exudate due to typhoid infection, and such is the case.

Recently the writer has had the opportunity of examining a large number of microscopical sections taken from a known case of typhoid fever, and soon after had occasion to examine some pleural fluid taken from another patient; a smear made from the centrifugalized deposit of the pleural fluid showed a picture identical with that which is so characteristic of tissues invaded by *B. typhosus*. One may see a somewhat similar picture in a pleural exudate from a case of pleurisy due to tuberculosis, lymphocytes and large mononuclears, but in tuberculosis the lymphocytes are largely in excess. In pleurisy occurring as a complication of typhoid fever the mononuclear phagocytes may equal or exceed the lymphocytes in point of numbers. One does not claim that an absolute diagnosis can be made in this way, but the claim is most emphatically made that when one sees such enormous numbers of large mononuclears in a pleural exudate the picture should act as a clue to a diagnosis, and one should at least think of typhoid infection and investigate further by means of the routine laboratory examination of blood, fæces and urine. In the absence of such a clue typhoid infection may be missed altogether and the pleural complication regarded as primary. Moreover, any practitioner who possesses a microscope, a few slides and a bottle of methylene blue stain, can make this examination for himself in a few minutes and perhaps alter the whole course of events by so doing.

The following is an actual case from practice.

In the absence of full clinical notes, only brief facts can be reported.

CASE REPORT

S. D., a female, suffered from pyrexia of unknown origin at the beginning of May, 1932.

On May 4th a serum agglutination test for typhoid and paratyphoid A. and B. proved negative in dilutions of 1 in 40 and higher. A few days later signs of fluid in the pleural cavity were detected.

On May 14th the chest was aspirated, and some pleural fluid sent to the laboratory for examination, the clinical diagnosis being one of primary disease of the lung and pleura; there were no typical signs or symptoms pointing to typhoid fever.

The pleural fluid was centrifugalized and smears were made from the deposit and stained with Leishman's stain and methylene blue; also by Gram's and the Ziehl-Neelsen methods. No organisms were discovered, but one could see at a glance that the microscopical picture was unusual, the most noticeable feature being the enormous number of large mononuclear cells which were mixed with lymphocytes. It was not a case of many lymphocytes and few mononuclears, as in tuberculosis; in this case the large phagocytes were as numerous as the small cells, and at once suggested to the writer that typhoid fever might be the primary disease, and the pleurisy a complication of it.

Acting on this supposition, and having obtained a blood sample, the writer proceeded to test the serum for typhoid agglutination. Using formalin-killed suspensions of typhoid bacilli and paratyphoid B., we obtained a positive agglutination of *B. typhosus* at a dilution of 1 in 40 and no agglutination of paratyphoid B. Ten days previously agglutination tests had proved negative for T. and paratyphoid B. at 1 in 40.

Another agglutination test was then made, this time with suspensions of live organisms; we now obtained agglutination of *B. typhosus* with a serum dilution of 1 in 160; no agglutination with paratyphoid B.

By using living organisms in the second test and obtaining agglutination with a serum dilution of 1 in 160 (confirmed by a second control test) we had a more convincing result, on the supposition that the patient's serum contained both H. and O. agglutinins, the H. agglutinins only being shown by the first test with formalin killed bacilli, and both H. and O. agglutinins being shown by the second test with living bacilli, with a preponderance of O. agglutinins in the serum, *viz., infection.*

There was just one possibility of a fallacy. At the first agglutination test on May 4th, using formalin killed organisms, no agglutination whatever was obtained with a serum dilution of 1 in 40, the lowest dilution used on that occasion. One cannot say, therefore, that there would not have been agglutination with a serum dilution of 1 in 20. Assuming then, for the sake of argument, that there was agglutination of *B. typhosus* with a serum dilution of 1 in 20 on May 4th, the subsequent rise in titre to 1 in 40 ten days later might possibly have indicated an anamnestic reaction, whereby agglutination at a very low titre, due possibly to a previous inoculation with vaccine, might have become temporarily raised to an agglutination at 1 in 40 by some other (non-specific) infection occurring subsequently. Fortunately, we were able to disprove this possible source of fallacy by a positive blood culture.

Using bile-salt-peptone broth as a medium and incubating at 37° C. we made a blood culture. Eighteen hours later a smear from the culture showed Gram-negative bacilli in large numbers. A hanging drop preparation proved these to be actively motile.

Two loopfuls of the fluid blood culture were then put on plates of McConkey's medium (bile-salt-lactose and neutral red agar) and incubated at 37° C. The following day there was a profuse growth of colourless colonies. Several of these were "picked" and cultured in the usual routine way for *B. typhosus.* The results obtained were:

Fermentation of glucose and mannite, acid, no gas. No fermentation of lactose or saccharose; gelatin not liquefied; litmus milk, slightly acid, but no clotting.

Confirmatory agglutination tests, using an anti-typhoid agglutinating serum with a titre of 1 in 5,260, showed agglutination of the isolated organisms to the titre of the serum.

The clue obtained from microscopical examination of the cell content of the pleural fluid thus led to further investigation and the proof that the case was one of typhoid fever. One may take it as an axiom that the well known cellular response in the tissues to typhoid infection will be duplicated in any pathological exudate, not necessarily pleural, due to invasion by *B. typhosus.* The occasions upon which one can make practical use of this fact, as in the case here recorded, may be more numerous than is commonly supposed; but even though they be few, it would seem that the possible prevention of even one typhoid epidemic or the protection of even one patient from repeated administrations of castor oil or other laxatives when suffering from an unrecognized typhoid infection would render any new clue to a correct diagnosis not unworthy of being recorded.

THE ISOLATION OF *B. typhosus* FROM SPUTUM

Since the foregoing notes were written another point of interest has arisen in the same case, which seemed to the writer to be a good one, an attempt at the isolation of *B. typhosus*

from the sputum. But you must "first catch your hare before you can cook it." In mental hospital practice it is often as difficult to obtain a specimen of sputum as it is from a small child, and so it proved in this case; but by watchful waiting for a couple of weeks we at last obtained a small piece of thick, tenacious sputum in a semi-dried condition; the prospects of isolating *B. typhosus* from such a specimen did not appear rosy. However, the attempt was made and success crowned our efforts as the following notes will show.

A direct smear showed no Gram-negative bacilli, and McConkey's plates inoculated directly from the sputum and incubated at 37° C. showed no growth at all. Meanwhile the small amount of available sputum had been put in a tube of brilliant green-peptone broth. Three days later some McConkey's plates were inoculated from the brilliant green tube. After incubation at 37° C. for twenty-four hours, many white colonies of a rough type and of the "vine-leaf" appearance described in the text-books appeared on the plates. Several of these colonies were picked and cultured on various media, with the following result:

No fermentation of lactose, saccharose or mannite. Fermentation of glucose with acid, but no gas. The organisms were actively motile, Gram-negative bacilli. Another set of plates yielded a like result and *B. typhosus* was not isolated.

A third attempt, after the sputum had been in the brilliant green-peptone broth for eight days, was rewarded by the recovery of *B. typhosus* from the sputum. This time McConkey's plates yielded two kinds of non-lactose fermenting colonies, one being of the rough type obtained after former platings, the other consisting of small, circular, slightly raised, semi-translucent, smooth-looking colonies of about 1 to 2 mm. in diameter. Several of these smooth colonies were picked and cultured in the usual routine way at 37° C. The results we now obtained were as follows:

No fermentation of lactose or saccharose. Fermentation of glucose and mannite, with no gas formation. Gelatine, not liquefied. Litmus milk, slightly acid, but no curdling. The organisms were found to be Gram-negative, non-spore bearing, irregularly staining bacilli, and actively motile.

An agglutination test was then made with an anti-typhoid agglutinating serum having a titre of 1 in 10,240. After incubation in a water bath at 55° C. for two hours the organisms isolated from the sputum were found to be agglutinated to the titre of the serum used.

The isolation of *B. typhosus* from sputum is not new, but at the same time it is not common. Most text-books dismiss the subject in a few lines such as "it has been" or "it may be" or "occasionally is" done. Thus, Box[3] states: "Although typhoid bacilli may be found in the sputum, and be found in the lung, pneumococci are also present." Cecil[4] writes "Lobar pneumonia is occasionally seen as a complication of typhoid fever. While in most of these cases some type of pneumococcus can be isolated from the sputum, occasionally the typhoid bacillus itself appears to be responsible for the pulmonary condition." Hutchison[5] refers to the necessity of treating the urine, fæces and sputum of typhoid patients with a liquid disinfectant, thereby implying that *B. typhosus* may be present in the sputum. Rundle[6] writes: "During life it (*B. typhosus*) may be obtained from the stools, urine and blood, and, less commonly, from the sputum . . . of persons suffering from the fever." Jordan[7] states: "Typhoid bacilli have been found occasionally in the sputum, although the majority of cases of pneumonia that occur during the course of typhoid fever are apparently caused by the pneumococcus. There is hence a possibility that typhoid fever may be spread by sputum infection, but it seems rather remote."

From the above references one gathers that the isolation of *B. typhosus* from sputum is regarded as a remote possibility rather than as a common occurrence. May it not be that it is not found more frequently because it isn't looked for, and not because it isn't present? It would seem that, in certain pulmonary complications of typhoid fever, the sputum may be just as potent a source of infection as the urine and fæces are known to be, and that a routine examination of the sputum for *B. typhosus* might well be carried out more frequently than it has been in the past.

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STAPHYLOCOCCIC INFECTIONS IN DIABETES*

BY J. A. GILCHRIST, B.A., M.B., AND S. L. ALEXANDER, M.B.

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THE intelligent use of insulin by both patient and his physician should control diabetes, even during the most severe complications. Prior to the discovery of insulin only the very mild cases could be kept alive and under observation for a period of time which would give adequate study of their condition. With the advent of insulin, however, the younger and more severely affected patients have been saved; the study of these has been most interesting and has led to certain far-reaching conclusions.

It has been found that the diabetic patient, whether on insulin or on diet alone, is a constantly varying problem. His tolerance for carbohydrate increases and decreases during a variety of complications, and we have found that factors which are negligible in the non-diabetic individual produce tremendous fluctuations in the diabetic state. It was found that the diabetic was extremely sensitive to a variety of complications, which in the non-diabetic, because of lack of symptoms, we were deeming of no importance. This is particularly the case for infections and toxæmias. Our clinical curiosity, aroused while treating acute exacerbations, led us to wonder whether or not these same conditions might not be persisting as chronic factors, thus keeping up the disease. It has been discovered that behind the syndrome known as diabetes there are certain definite complications. When these complications are treated, or where possible eradicated, we are encouraged to find that the carbohydrate tolerance improves, as evidenced by lower insulin dosage or increased ability to handle carbohydrate.

The history of these complications must be sought for in the years previous to the onset of the disease and they may be briefly summarized as follows:—(1) arteriosclerosis; (2) obesity: (3) cranial injuries; (4) endocrine gland disturbance, (*a*) thyroid, (*b*) pituitary, (*c*) suprarenal, (*d*) menopause; (5) focal infections; (6) toxæmias.

These complicating factors were searched for not only in those cases which were frankly diabetic, as evidenced by increased blood sugar and glycosuria, but also in the incipient cases with normal fasting blood sugars but showing some impairment of carbohydrate tolerance, as evidenced by abnormal glucose curves. It has been found that in all cases, ranging from the incipient down through the mild to the extremely severe diabetes, we are dealing not with a single factor but with several, and the severity of the diabetes varies directly with the severity of the complicating conditions.

The progress towards recovery which was achieved by treating the complications led to the publication of "The curability of diabetes mellitus" in 1929.[1] The two patients referred to in that paper have reported recently for rechecking. Patient No. 1 has been constantly on a diet of carbohydrate 339 grams, protein 103 grams, fat 130 grams, and still has a considerable degree of obesity (45 lbs. over his standard weight), is still treating his cholecystitis with papain and bile-salt tablets, and has a blood pressure of 142 (systolic) and 100 (diastolic). Following an acute nasopharyngitis two years ago, this patient now has a chronic maxillary sinusitis. Patient No. 2 has been on a totally unrestricted diet and has his chronic cholecystitis. Both these persons after three years of normal diet show absolutely normal glucose curves following the ingestion of 100 grams of glucose.

Since that date advances in pathology and physiology have thrown further light on this disease and confirmed the clinical findings that in a large percentage of patients this disease is curable, and furthermore, that return to a normal diet and cure can be achieved within a very few months of commencement of treatment. Three short histories will suffice.

CASE 1

Female, aged 52. Symptoms of diabetes developed in January, 1931, and the disease was diagnosed in April. Previous illnesses included a history of bilious attacks with headaches for a number of years, an attack of influenza and sore throat in February, 1931, and the removal of one abscessed tooth in March, 1931. A diagnosis of toxic adenoma was also made, and confirmed on thyroidectomy on June 13th. At this time the patient was on a diet of carbohydrate 100 grm., protein 70 grm., fat 100 grm., and the insulin dosage was 10 units.

* Read by title at the Sixty-third Annual Meeting of the Canadian Medical Association, Toronto, on June 23, 1932.

On July 8th, her diet was carbohydrate 91 grm., protein 63 grm., and fat 101 grm. Without insulin the fasting blood sugar was 0.095 per cent. Further complicating factors at that time were: (1) secondary anæmia (hæmoglobin 63 per cent); (2) chronic tonsillitis and chronically infected antrum; (3) chronic cholecystitis with two gall stones; (4) persisting dental infection with four abscessed teeth; (5) obesity, being thirty pounds over weight.

In the early part of November two teeth were extracted, and by December the patient's diet had been raised from its previous level in July of 91 grm. of carbohydrate to 209 grm. of carbohydrate. This case has been most instructive because of the rapid progress made after eliminating her hyperthyroidism, her obesity and her dental infection, in spite of the continuing chronic infections in her gall bladder, tonsils and antrum. If chronic infection aggravates the diabetic condition through stimulation of thyroid and suprarenal, it will be most interesting to see if this patient develops hypothyroidism when these remaining chronic infections are eliminated. On February 11th, her fasting blood sugar was 0.096 per cent, and her diet was 263 grm. carbohydrate.

CASE 2

A lad of sixteen was admitted to hospital on October 14, 1931, in a state of pre-coma, with a blood sugar of 0.532 per cent and a history of diabetic symptoms dating back to August, 1931. Complicating factors in this case were a chronic cholecystitis and a possible infected antrum, which on washing showed only a few shreds. X-ray showed slight thickening of the antral mucous membrane, and it was felt that this antrum was infected and would again become active with the winter's cold and dampness. An antranasal drainage was advised and under gas oxygen intratracheal anæsthesia, the antrum was again washed, with negative results, and an antranasal opening was made. The antral wash showed a pure culture of *Staph. aureus hæmolyticus.*

In one week following operation, the patient had dropped in insulin dosage 25 units; in two weeks, 33 units; and inside of three weeks was off insulin entirely, having dispensed with 45 units of insulin given in four doses daily. At the end of the eighth week, we were pleased to report a drop in insulin dosage of 45 units and an increase over first diet of 51 grm. carbohydrate, 15 grm. protein, and 6 grm. fat, which equals 60 grm. available glucose. The patient was sugar-free and the fasting blood sugar was 0.091 per cent. After fourteen weeks his diet was carbohydrate 263 grm., protein 115 grm., fat 144 grm. and his fasting blood sugar was 0.083 per cent.

CASE 3

This case will be an encouragement to the long-standing diabetic. This man has had the disease for 12 years and was enabled to raise his diet from 189 grm. of carbohydrate to 296 grm. in three and one-half weeks following tonsillectomy, despite the fact that he still had as complications cholelithiasis, a basal metabolic rate of plus 19 per cent, and a moderate degree of arteriosclerosis. Within seven months his glucose curve was not only normal but a low normal.

The rapid clinical progress of these cases, which have been reported previously, combined with the fact that in the human type of diabetes we often have no constant pathological finding in the organ which is concerned in the manufacture of the diabetic hormone, led up to our theory of inactivation of insulin within the body of the diabetic patient.[2] It was pointed out in that paper that a number of substances can inactivate insulin. These include some of the digestive ferments, various anæsthetics, and epinephrine. Also the secretions of certain of the endocrine glands such as the thyroid, pituitary and suprarenal, are antagonistic to insulin activity. Furthermore, Lawrence and Buckley,[3] working with diphtheria toxin, and Evans and Zeckwer[4], with killed *B. coli* or *B. proteus*, found hyperglycæmia in rabbits and lowered response to insulin. These observers felt that these effects were produced through stimulation of the thyroid and suprarenal glands, both of which are antagonistic to insulin activity. For a number of years we have observed clinically the frequency of staphylococcic infection in diabetics. and the marked improvement obtained when this infection was eradicated. We also have frequently observed a lowering of the basal metabolic rate, coincident with the diabetic improvement, following elimination of staphylococcic focal infection.

Working on this theory of inactivation of insulin during the last three years, it has been discovered that staphylococcic infection was present in the diabetic patients more commonly than was previously supposed. One fifteen year diabetic in whom no ætiological factor could be discovered other than multiple sinus infection, three years ago was found to have a pure culture of *Staph. aureus.* This organism has since been found repeatedly in pure culture, with only one exception. This was during an acute infection of the frontal sinus. At this time staphylococcus and streptococcus were found together, and although the patient had a temperature of 103° and was acutely ill, there was no mental depression or any serious upset of his diabetic condition during the ten days' illness. This was markedly different from the increased insulin dosage which always accompanied a pure staphylococcic infection.

For a number of years it was felt that we had been overlooking focal infection in the upper respiratory tracts of our patients. When glycosuria developed in the aglycosuric patients the cause was always sought for, and when it could not be discovered elsewhere a most painstaking and thorough examination of the nose and throat often gave evidence that some slight infection was present, accounting for the difference in the diabetic condition. The patient often had no clinical symptoms associated with sinus or nasopharyngeal infection. One patient, who had

barely been maintained aglycosuric for a period of six months, was found to have some slight darkening of one maxillary antrum. She gave no history of head-colds for a period of over two years, yet antral lavage yielded thick creamy pus which showed a pure culture of *Staph. aureus*. Several antral washings cleared up this condition, resulting in a steady increase in her carbohydrate tolerance.

Examination of the upper respiratory tract often reveals gross infection of the sinuses, tonsils or nasopharynx. More careful examination may reveal hidden or slight infection, which in the non-diabetic might be treated palliatively.

Tonsils and adenoids are always open to suspicion, and where tonsillectomy has been performed the tonsillar fossæ will often show infected lymphoid tissue or tonsillar tags. The nasopharynx is one of the commonest areas of infection, where there is often hypertrophy of the lymphoid tissue of the pharyngeal wall or of the lateral pharyngeal ring, known as lateral bands. Frequently, infection in this area gives no symptoms of soreness or dysphagia and no elevation of temperature or of the white blood count.

The question of what constitutes antral infection is still unsettled. There is no difficulty where occult pus, transillumination, and positive x-ray findings confirm clinical examination and history. However, in cases where lavage and transillumination are negative and radiological findings only suspicious we must resort to bacteriological culture, using the Watson Williams syringe and technique. Recently radiological technique has been improved so that the films show the thickness of the mucous membranes of the antral cavities down to a millimetre. With the x-ray showing slight thickening of the mucous membrane, and with positive bacteriological cultures, we feel we are justified in considering this cavity as a site of focal infection. When all the ordinary means of examination of the frontal, ethmoidal, and sphenoidal sinuses have been exhausted we sometimes have to depend on the radiological findings. It is wise to have two or three nose and throat examinations before giving an opinion as to focal infection in the diabetic.

We realize the impossibility of eradicating all infection from the sinuses, but in the diabetic we feel justified in employing more extensive surgery than in the non-diabetic, because of the improvement to be gained in the diabetic condition.

A year ago a series of 30 of our diabetics who harboured various forms of nose and throat infections were cultured, and of this number, 100 per cent showed a culture of *Staph. aureus* or *albus*. Sometimes this was in pure culture and sometimes mixed with streptococci and diphtheroids. Treatment of these diabetic sinuses was tried with bacteriophages, where the bacteriophage was found to be active, and slight improvement was obtained in only one patient, and that during an acute exacerbation. Surgical eradication of these apparently trivial infections stabilized the diabetic condition, and often lowered to normal an elevated blood non-protein nitrogen figure. So slight were these focal infections that abnormalities in the white and differential blood counts were often not obtainable. Our own experience has been borne out by Lierle and Potter.[5] These observers concluded that chronic and subacute infections of the upper respiratory tract were common in diabetic children; that frequent improvement in general health and carbohydrate tolerance followed removal of the focal infections; and similar results were obtained in the arthritic and nephritic.

Balmer[6] states that antral washings are untrustworthy. Some 76 per cent of his cases were bacteriologically positive when antral washings were negative. The four organisms most commonly found in his series were staphylococcus, streptococcus, diphtheroids and pneumococcus.

Furthermore, in a series of 300 cases in our diabetics, it was found that 57 per cent had pathological gall bladders, and the majority of these were of the chronic type. Excellent results have been obtained by treatment of these with the use of papain and bile-salt tablets. Cholecystectomy was performed in only 6 cases which were showing frequent severe exacerbations. Only one was cultured, and this showed a pure *Staph. aureus* in the submucosa. Drs. Magner and Hutcheson[8] report a series of 200 gall bladders in which they found staphylococcus in pure culture in 19.5 per cent; and from the submucosa tissue of the gall bladder staphylococcus in 36 per cent. In the chronic or fibrotic type of gall bladder, the submucous tissues were 43 per cent positive for staphylococcus. In a series of 400 tonsil cultures by DeWayne G. Richey,[9] staphylococci were found in 93 per cent.

Staphylococcic toxoid was used in 19 cases of diabetes mellitus, but, with so many varying factors present, no definite conclusions could be drawn as to its efficacy.

We are indebted to Drs. A. C. Norwich and Neil McKinnon for bacteriological findings and to Dr. J. A. Sullivan for some of the clinical reports incorporated in this paper, and to the 19 patients for their ready acquiescence to be experimental subjects in an investigation that may affect all other diabetics.

CONCLUSIONS

1. It is felt that the removal or treatment of the ætiological factors underlying diabetes mellitus will permit the cure of this disease in a large percentage of cases.

2. It is felt that we may be dealing with a staphylococcic factor in diabetic focal infections other than those in the upper respiratory tract. All foci of infection in the diabetic should be repeatedly examined for staphylococcus.

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HYPEREMESIS GRAVIDARUM TREATED AS A TEMPORARY ADRENAL CORTEX INSUFFICIENCY

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HYPEREMESIS gravidarum of the first trimester of pregnancy, like eclampsia of the third trimester, may well be called a "disease of theories." The nausea and vomiting which the late Prof. Whitridge Williams said occurred in 50 per cent of all pregnancies has been variously described as "physiological," "psychic," or as "toxic," and the methods of treatment vary accordingly.

The treatment recommended in this communication is based on the opinion that the nausea and vomiting of the first trimester is due to the presence in the maternal blood of "toxic metabolites" resulting from a temporary relative insufficiency of secretion from the vital *adrenal cortex*. This therapy has been given a thorough and general trial by many of the writer's colleagues in Vancouver during the past eighteen months, and the results have been almost entirely favourable in ambulatory cases. In addition to cases already reported,[1] the following are submitted, with the kind cooperation of professional friends in Vancouver.

CASE 1

Mrs. M., aged 26; para-1; patient of Dr. F. N. Robertson. This patient first consulted her physician on October 28th last, for the relief of nausea and vomiting. Examination and history showed that she was seven weeks pregnant. She was advised to take suprarenal cortex (Armour) gr. iii, t.i.d. Within 24 hours vomiting ceased. The medication was continued for one week only. Within two weeks the nausea and vomiting returned. It was again effectively controlled by cortex therapy.

CASE 2

Mrs. Y., aged 25; para-1; patient of Dr. Shimo-Takahara. When first seen by her physician on August 15th last, she was three months pregnant, and complained of excessive vomiting, especially marked in the preceding month. Dr. Takahara tried the time-honoured remedies without success. Later he prescribed some form of adrenal cortex in a daily dosage of gr. vi. Nausea and vomiting ceased on the third day and her subsequent course has been satisfactory.

CASE 3

Mrs. T., aged 27; para-1; patient of Dr. Shimo-Takahara. When seen by her physician about September 1st last, she was two months pregnant. Her complaint was excessive nausea and vomiting. She was given adrenal cortex of gr. vi daily. Vomiting ceased on the third day. A daily dosage of gr. ii was found to be sufficient to keep her symptom-free.

CASE 4

Mrs. R. M., aged 30; para-2; patient of Dr. L. Pedlow. This woman was attended by Dr. Pedlow during her first pregnancy three years ago. He states that she was never entirely free of nausea and vomiting during the nine months in spite of the diligent administration of various forms of medication. About July 15th last, she again consulted her physician for vomiting and nausea that was severe enough to confine her to bed. History and examination showed that she was seven weeks pregnant. She was given suprarenal cortex (Armour), gr. vi. t.i.d., for three days. Then, vomiting having stopped, the dosage was halved. She was able to get up and about in three days and has continued to feel well.

CASE 5

Mrs. J. R., aged 24; para-2; patient of Dr. L. Pedlow. This patient suffered from excessive vomiting in her first pregnancy. When two months pregnant she consulted Dr. Pedlow on account of nausea and vomiting. She was given suprarenal cortex (Armour), gr. vi, t.i.d., for three days, when vomiting ceased. She was on half this dosage when she had a miscarriage three weeks later.

CASE 6

Mrs. J. C. M., aged 20; patient of Dr. W. E. Harrison. About July 7th last, when six weeks pregnant she consulted her physician for the relief of excessive vomiting. She was given suprarenal cortex (Armour), gr. vi. t.i.d., for two days and then gr. iii. t.i.d., for two days. Vomiting stopped on the fourth day. She took a total dosage of 180 gr. and then ceased medication. With the exception of a little morning sickness she has remained well.

CASE 7

Mrs. S. D. R., aged 30; para-1; patient of Dr. W. E. Harrison. This patient consulted Dr. Harrison on October 7th last, for excessive vomiting. She was then found to be ten weeks pregnant. She was given suprarenal cortex (Armour), gr. iii. t.i.d., between meals, with an alkaline sedative mixture before meals. Vomiting stopped on the fourth day. She took a total of 180 grains and has remained in good health.

CASE 8

Mrs. W. S., aged 26; para-2; a staff patient at the Vancouver General Hospital in the service of Dr. W. B. Burnett. Admitted to Ward R, Vancouver General Hospital on July 15, 1932, complaining of morning sickness since May 10th, becoming progressively worse until three weeks before admission, when it became very severe. For the previous ten days she had been unable to retain any food.

She was given intravenous injections of glucose, 5 per cent, 1,500 c.c., twice daily, combined with the rectal instillation of Lugol's solution mm. xxx in four ounces of water once a day. After two days of this treatment vomiting stopped. She was then put on suprarenal cortex (Armour), gr. iii. t.i.d., and a light diet prescribed. She continued free of nausea and vomiting and was discharged three days later.

Shortly after returning home, she stopped her cortex medication because she felt so well. Unfortunately, the severe vomiting returned and she visited the Out-patient Department again on August 9th. She was put on suprarenal cortex gr. iii. t.i.d. She returned to the Out-patient Department on August 16th, still having slight nausea in the mornings. She was put on an increased dosage of cortex (gr. iv. t.i.d.) and told to report back in two weeks.

When she returned on September 13th she had no nausea and her previous medication was renewed. Patient has not returned since but has reported that she feels "fine" and entirely free of nausea and vomiting.

DISCUSSION

Many other similar case reports could be recited as evidence of the effectiveness of adrenal cortex therapy in the treatment of hyperemesis gravidarum. The common criticism of any form of medication in this condition is to the effect that the vomiting is entirely psychic and any treatment will be effective if sufficiently well backed by the assurances of the physician. In view of the fact that the majority of women experience morning sickness at least in the first trimester of pregnancy, this view of the psychic etiology of hyperemesis would appear to be an extreme and unjustified one. No doubt, as in other clinical conditions that physicians are called upon to treat, the psychic element may be a factor. However, to assume that the majority of pregnant women are neurotic and that their vomiting is "psychic" is a diagnostic habit that is akin to classifying as "neurasthenia" all physical conditions that cannot be easily diagnosed. The following experiment in treatment illustrates the fallacy of the so-called psychic etiology of hyperemesis gravidarum.

In cooperation with Dr. A. C. Frost, of Vancouver, a woman who had been treated successfully in a previous pregnancy (by hypodermic injection of corpus luteum) was given a series of sterile water hypodermic injections when she reported the occurrence of vomiting in a second pregnancy. She thought that she was receiving the same medication that had been previously effective. In spite of this "psychic" influence she continued to feel nauseated and to vomit. Unknown to her, an ampoule of suprarenal cortex liquid (Armour) was then substituted for the sterile water. Two hours later she felt it incumbent upon her to call Dr. Frost on the 'phone to tell him how well she felt and how she had enjoyed her dinner. The stoicism of and the infrequency of neurosis in the Japanese race is well known to physicians of the Pacific coast. Cases 2 and 3 (Dr. Shimo-Takahara) were Japanese women.

THE RATIONALE OF ADRENAL CORTEX MEDICATION

The therapeutic use of adrenal cortex in hyperemesis gravidarum was first suggested to the writer by a consideration of the following well established clinical and experimental facts:

1. The maternal adrenal cortex always undergoes hypertrophy during pregnancy.[2, 3]

2. The first signs of adrenal cortex insufficiency in adrenalectomized animals are anorexia and vomiting.[4, 5, 6]

3. The first signs of Addison's disease (adrenal cortex insufficiency in human beings) are aversion to fatty foods and morning vomiting (regardless of sex); in the subsequent crises of this disease gastrointestinal symptoms play a major role. The recent experimental work of reputable physiologists shows that in the absence of sufficient cortico-adrenal secretion a profound upset in body chemistry occurs, which, if not relieved by injections of a potent extract of beeves' adrenal cortex, results in death. Banting and Gairns[7] have shown that in the presence

of this insufficiency of cortico-adrenal secretion the liver bears the brunt of the pathological changes resulting from this grave disturbance in body chemistry while degenerative changes also occur in the kidneys. In discussing the pathological findings of two fatal cases of pernicious vomiting of pregnancy, O. Fränkel[8] has shown that pathological changes were demonstrable in the adrenal cortex and liver and kidneys in each case.

From a consideration of the above and other experimental and clinical findings, it is reasonable to postulate that *the liver only exercises its manifold and essential functions in the presence of an adequate supply of a catalyst or autocoid (possibly several) which is a secretion of the adrenal cortex.* In the absence of this secretion death is inevitable. Where there is only a partial insufficiency of this vital secretion, as in pregnancy in the first stage, there occurs an incompleteness of liver function and the consequent presence of varying amounts of toxic metabolites in the blood stream. As in the victims of Addison's disease, the presence of these toxic metabolites results in simple "morning sickness" or in severe vomiting according to the degree of the insufficiency.

When the evil consequences of starvation acidosis, or, more accurately, starvation ketosis, are superimposed upon the ill results of the cortico-adrenal insufficiency, a vicious circle is established which, whether known as "pernicious vomiting" of pregnancy or as a "crisis" in Addison's disease, inevitably results in death unless broken. This break in the vicious circle can only be effected by intravenous fluids and in the case of Addison's disease or the vomiting of pregnancy, the gains of intravenous fluid therapy are best consolidated and maintained by the addition of subcutaneous or oral administration of a *potent* cortico-adrenal extract.[9, 10, 11]

CONCLUSIONS

1. Hyperemesis gravidarum is due to a relative insufficiency of maternal cortico-adrenal secretion to meet the new demands upon maternal metabolism.

2. Until such time as there is a compensatory hypertrophy of the maternal adrenal cortex (about the third month presumably), the oral ingestion of a potent dessicated extract of beeves' adrenal cortex is effective in preventing and curing early cases of hyperemesis gravidarum.

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ADDISON'S DISEASE: FURTHER REPORT ON TREATMENT WITH "INTERRENALIN" (ADRENAL CORTICAL EXTRACT).—J. M. Rogoff describes the management of Addison's disease and its treatment with adrenal cortical extract which represents the indispensable hormone (interrenalin) of the gland. The treatment is a direct development of experimental work conducted in the laboratory and is based on the newer concept of the relation of the adrenals to the disease. Interference with the supply or function of interrenalin, from the cortex, and not epinephrine, from the medulla, is responsible for development of the syndrome. The clinical picture of adrenal insufficiency in adrenalectomized animals is quite comparable with that seen in the acute crises of Addison's disease. Recently, subacute and chronic manifestations and pathological lesions in the adrenal glands, comparable or identical with those occurring in Addison's disease, have been successfully created in experimental animals. In both human cases and experimental animals the blood shows the same changes. There is an increase in the total non-protein nitrogen, in urea nitrogen and particularly in the "undetermined fraction" of the non-protein nitrogen. Blood sugar is usually only moderately diminished; calcium is frequently increased and the relative volume of corpuscles to plasma is increased. In animals there is no significant reduction in blood pressure until the acute phenomena develop. The period of good health, following total loss of the adrenal glands, ranges from one to two weeks. During this period there is no indication that the loss of the glands has affected the blood pressure. All the available evidence, from the author's experimental and clinical studies, supports the concept that the symptoms seen in Addison's disease and in adrenalectomized animals constitute manifestations of metabolic disturbances that lead to a severe intoxication. It was observed not only that these disturbances can be relieved by administering adrenal cortical extracts but also that amelioration of symptoms and prolongation of life can be effected, in adrenalectomized animals, by intravenous administration of physiological solution of sodium chloride. Of course, this does not supply a missing hormone, and its beneficial influence can be explained only on the basis of dilution of toxic material and facilitation of its elimination. Thus, it becomes an indispensable adjuvant in the treatment of Addison's disease with extracts representing the hormone of the adrenal cortex. The comparison of cases treated with interrenalin and those under other treatment demonstrated decided prolongation of life and amelioration of symptoms in the former. Permanent relief or cure of the syndrome, however, can rarely, if ever, be accomplished. Addison's disease is the result of lack of function of the adrenal cortex (interrenalin) and not of the medulla (epinephrine).—*J. Am. M. Ass.*, 1932, **99**: 1309.

ULCERS OF THE ŒSOPHAGUS*

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VI.

ULCERS of the œsophagus, from the roentgenological point of view, present much the same appearance as ulcers found elsewhere along the gastro-intestinal tract; and the methods employed in their demonstration are, in general, similar to those employed in gastro-intestinal examinations, namely, fluoroscopic and plate analysis following ingestion of a barium meal.

The forms of ulcers found in the œsophagus are classified into the following groups: (1) malignant: carcinoma (most common), sarcoma; (2) Traumatic: thermal, chemical, caused by foreign bodies; (3) peptic; (4) infectious; (5) varicose; (6) aneurysmal; (7) syphilitic; (8) tuberculous; (9) blastomycotic and actinomycotic.

While one can classify the ulcers pathologically into the above-mentioned groups, it must be appreciated that, when one considers them roentgenologically, usually they cannot definitely be differentiated, and the exact classification must be made by supplementary methods.

INCIDENCE

It is very difficult to obtain any satisfactory statistics from the literature, as, until comparatively recent years, only those ulcers were recorded which were found at post-mortem examinations. Since the development of roentgen-ray and œsophagoscopic examinations in the past thirty years there has been an increase in the number found, but unfortunately the reports are very scattered, and no complete collection has been made. I feel that there will be a steady increase in the number diagnosed, and that in the near future, when more are reported, we may expect more complete statistics than at present exist.

Malignant ulceration—Ulceration begins early in malignancy, being absent in only 5 per cent of cases, according to the records of St. George's Hospital. In our series all have shown ulceration. According to the statistics at present available this type of ulcer is by far the most common. It has been estimated that approximately 5 per cent of all carcinomas arise in the mucous membrane of the œsophagus. This is essentially a disease of the male sex, 80 per cent being found in the male, according to Choyce.[1] The age incidence shows it to be a disease of later life, usually after 40, although in the female it is more frequently early than in the male. The incidence as to the most common site varies greatly according to the different writers, although they all agree that it is usually found at the normal anatomical narrowings, but when in one series the upper third shows the higher percentage, the next writer in his reported cases shows the lower third to lead. In our cases, the lower third has been the part most commonly involved.

Peptic ulcers.—The first described case was that of Albers, in 1839. From that time until 1906 some 41 cases were recorded. These were collected, and reported by Tileston[2] in his paper in 1906. Since then some 20 cases have been reported, although I am sure many more have been diagnosed but have not, as yet, been reported. This type of ulcer is most commonly seen in patients of middle life, although it has also been found in infants and the aged. The sex incidence varies with various writers. Tileston in a study of 40 cases found 28 in the male and 12 in the female, whereas Friedenwald, Feldman and Zinn[3] showed in a series of 13 cases 6 in men and 7 in women. Practically all cases were found in the lower third.

Tuberculous ulceration is rare, and it is doubtful if it ever occurs as a primary lesion. It is usually secondary to pulmonary involve-

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Preceding articles in the second series on physiotherapeutical subjects can be found in the *Journal*, 1932, **27**: 521, 612; 1933, **28**: 30, 182 and 246.

ment. Our one case was definitely secondary to lung involvement. Syphilitic ulceration is also considered rare and is usually found after forty. Ulcers have been described in a number of infectious diseases, *e.g.*, typhoid fever, scarlet fever, diphtheria, pneumonia and small-pox, but are undoubtedly rare. Varicose ulcers are associated with varicosities of the veins, and are nearly always found near the diaphragm. These may or may or may not be associated with cirrhosis of the liver.

ETIOLOGY

The etiology of the various forms of ulceration found in the œsophagus is no different from that of similar types found elsewhere in the body, although perhaps the peptic ulcer has caused more controversy than the others. Practically all the writers agree that regurgitation of gastric secretions is an important factor. Friendenwald, Feldman and Zinn feel that this alone cannot produce ulceration, but that there must first be present some change in the mucosa. Jackson[4] states that in his series 90 per cent had a chronic focus of infection. He also feels that the presence of islands of gastric mucosa in the œsophageal mucosa may be an important factor.

PATHOLOGY

The pathological findings in the various types of ulceration found in the œsophagus do not present anything different from the findings in similar ulceration elsewhere in the body. Ulceration in malignancy and in peptic ulcers may progress to perforation, with a high mortality rate. As the result of perforation we may have mediastinitis, broncho-œsophageal fistulæ, pneumonia, etc. Cicatrization may occur, most commonly in traumatic ulcers, although it has been recorded from peptic ulcer, and in actinomycosis.

SYMPTOMS

The symptoms vary with the differential types, and change with the progress of the disease.

Pain is present in all types, and varies considerably in intensity with the site and size of the ulcer. In malignancy the pain is noted earlier, and is more pronounced if the ulcer is situated high up, whereas in the lower third it may be a late symptom. In the peptic ulcer it is a pronounced and early symptom, and in our two cases was the first symptom noticed. It is usually, in peptic ulcers felt in the epigastrium, or under the lower portion of the sternum. While it is true that similar pain is felt in gastric and duodenal ulcers, and in some cases of gall-bladder disease, nevertheless if these can be excluded one should consider the possibility of the presence of œsophageal involvement.

Dysphagia is present in nearly all forms of ulceration, but varies with the size of the ulcer. It is more noticeable in malignant, and peptic types.

Vomiting is frequently present in malignant ulceration, and in peptic ulcers. Tileston reports 70 per cent in his series of peptic ulcers.

In Friedenwald, Feldman and Zinn's series of peptic ulcers hæmorrhage was present in 23 per cent, and in Tileston's series it was noted in 53 per cent. Occasionally it may be so severe as to cause death. In malignancy profuse hæmorrhage is not common. In 214 cases reported by Hampeln[5] profuse hæmorrhage occurred in 12, or roughly 6 per cent. In varicose ulcer it is not uncommon and a number of fatal cases have been reported. In other types it does occur but is not common.

Perforation occurred in 14 per cent of Tileston's series of peptic ulcers. In malignancy it is a complication, but I have been unable to obtain any definite percentage. In our own experience it is not very frequent. It is not common in tuberculous nor syphilitic ulcers.

DIAGNOSIS

The history and symptoms play an important rôle, but the two methods of investigation which are undoubtedly the most efficient and helpful are the roentgen-ray and œsophagoscopic examinations; both are absolutely necessary, and are supplementary to each other.

The roentgenologist nearly always sees the patient before the œsophagoscopist, and consequently on him rests a great responsibility to discover any findings which suggest the presence of anything abnormal, and while it has previously been mentioned that the final diagnosis rests with the œsophagoscopist and the pathologist, nevertheless in the majority of cases the examination either ends, or is continued further, mainly on the findings of the roentgenologist. Therefore the latter must

accept and realize his responsibility, and consequently should employ every method of x-ray examination known in his study of the case. The fluoroscopic examination, while a barium drink is being swallowed, usually demonstrates spasm and delay, and, in cases of long standing, dilatation above the site of the lesion. Often in early cases we have found that information was best obtained by watching a large barium-filled capsule being swallowed. The capsule usually will hesitate or dance at the site of the lesion. The patient, of course, must be rotated in all directions during the fluoroscopic examination. In the subsequent plate examination we make the patient swallow a thick barium paste, and then take plates in several directions.

The findings in any ulcer case vary considerably, in that we may or may not demonstrate a niche or crater. Also we may find evidence of induration, as is shown by the loss of pliability, or may have definite encroachment into the lumen from growth, or there may be marked dilatation only, or perhaps, again, the only sign is one of spasm. In considering spasm, which is usually our earliest sign, this may be so marked as to cause early and marked dilatation above it. From our experience with a number of so-called cardiospasm cases, I believe that many of these are really cases of unrecognized peptic ulcers in the lower œsophagus, which can be demonstrated by careful œsophagoscopic examination of this area. This, of course, leads to a controversy as to whether the ulcer is primary and the spasm and dilatation secondary, or whether the ulcer is secondary to the condition now known as cardiospasm. In one of our cases the ulcer could only be seen by means of the œsophagoscope. Active peristalsis, seen in the fluoroscopic examination, should at once cause one to be on the lookout for an œsophageal lesion. While I know this can also be caused by a lesion in the stomach or even in the gall bladder, nevertheless it is a helpful finding. However, I feel that differential diagnosis is really in the realm of the œsophagoscopist and the pathologist, and our rôle is to determine the presence or absence of abnormal conditions.

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HEREDITY AS AN AID TO MODERN THERAPY

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MEDICAL thought is gradually but definitely becoming permeated with the idea that heredity is an important etiological factor in disease. In the past there have been those who have recognized the great value of a knowledge of the science of genetics as applied to medicine, but there have been many who have scoffed at the idea that an intimate acquaintance with the laws of heredity could possibly have any practical value, indeed have even scoffed at the very idea that diseases were inherited. Fortunately this is being changed, albeit slowly, and we are coming to realize that a knowledge of the science of genetics may be used to improve old or to devise new modes of therapy. It is the purpose of this article to emphasize how an appreciation of the laws of inheritance has served the practitioner in dealing with two diseases for which there has been in the past no real aid. These two diseases are hæmophilia and retinitis pigmentosa.

THEORIES OF SEX INHERITANCE

When one stops to think, one recognizes that all that we are, our potentialities, our development, our ultimate attainments are bound up with our inheritance. True, these may be modified, usually in a deleterious manner, by our environment, but with that we are not dealing at present. It is seldom realized that among the many attributes which we inherit is one that we are more or less accustomed to think just belongs to us, and which we do not inherit as we do our eye-colour, or hair-colour or musical ability. That attribute is sex. Just as we inherit from our parents the mode of develop-

ment that turns us into a human baby instead of a kitten or a mouse, just as we inherit a mode of development that makes us normal mentally or turns us into an idiot, so we inherit our sex. And, most curiously, the female inherits her sex from both her parents; the male inherits his from his mother. Such a conception may seem absurd, but a moment's reflection on the processes which precede fertilization will show that such is the case. Locked up in the germ cells are all the hereditary potentialities which mould our course of development. These are grouped into packets called chromosomes. In the human female there are forty-eight of these in each germ cell which, when the egg undergoes maturation in preparation for the great event of fertilization, separate into two groups of twenty-four each. One group of twenty-four remains behind in the now mature ovum, to carry on to the next generation some of the characteristics of the generations that are past. The sperm-cells of the male undergo the same preparation, dividing their packets of determiners of hereditary characters into two groups. But the sperm differs from the egg in this respect. There are forty-seven of these packets, plus one odd little fellow that is obviously different from the rest. One set of these packets, numbering two in the female, is the one which holds the determiners for sex. One set in the male also determines sex in that individual, but whereas the two in the female are alike, the two in the male are made up of one ordinary-looking and the odd little chromosome. For convenience we will give the names to these that are used in genetics. The two chromosomes in the female that determine sex are called XX while the two in the male are called X and Y. The Y chromosome is the one that is different from the others. Now at maturation the egg cell will retain one of the X packets and let the other one go into the polar body. The sperm may retain either the X or the Y, but not both.

When fertilization occurs, it all depends on the sperm as to what the sex of the future baby will be. If an X sperm unites with the egg which has an X, the result will be a female with two X. She has inherited her sex from both parents. If the sperm with the Y in it unites with the egg with an X, then the baby will be male, because it is X Y. The Y seems to have no use in the scheme of heredity, carrying with it no real value; it is excess baggage. The one X packet connected with sex which the male has, came through the egg cell, hence the male inherits his sex from his mother.

But each of these packets contains far more than one determiner; that is, each one has to do with a great many characters that are inherited. These other characters that are wrapped up in the sex chromosome, like the attribute of sex, go from mother to son, and not from father to son. How many normal characters there are tied up in the sex packet we do not know; for it is hard to trace normal characters when everybody has them. There are many abnormal traits, however, which are linked with sex that are easy to trace. Examples of these are hæmophilia, retinitis pigmentosa, Leber's disease, in some cases, and colour-blindness, etc.

PRACTICAL APPLICATIONS

What has all this theory to do with modern therapy? What can one do with sex chromosomes to cure disease? With chromosomes for a background several modern workers have managed to evolve what promises to be brilliant therapy. Their line of argument is somewhat like this. "The male has but one sex chromosome, the female two. That difference of one chromosome in some way holds the sex-linked disease in abeyance in the female; its absence allows the disease to be evident in the male. Moreover, that one chromosome permits the development of the essential female tissue, namely ovaries, which produce ovarian hormone. If ovarian hormone is given to the male affected with these sex-linked diseases, it may do for him what the extra sex chromosome does for the female, that is, inhibit or arrest the disease."

Working on this hypothesis, Birch[1] used ovarian extract and ovarian transplants as therapeutic agents on two hæmophiliac males, with brilliant results. Foord and Dysart,[2] following her work, used ovarian extract on a male who was apparently a hæmophiliac and who bled excessively after tonsillectomy. He had denied any undue tendency toward bleeding before operation, but later stated that he and three brothers were all bleeders. After the operation he began to bleed profusely. Sponges were sutured into the tonsillar fossa; injection of thrombo-plastin, and, finally, transfusion of

500 c.c. of citrated blood were tried before the hæmorrhage was controlled. Two days later when the effect of the transfusion had worn off, bleeding recommenced, and the pulse rose to 150. Again transfusion stopped it for several days, and again bleeding started. This kept up very briskly for thirty minutes, when 1 c.c. of ovarian extract (Parke, Davis) was administered. In five minutes the bleeding had wholly stopped and the man went on uneventfully to complete recovery. They record the case, and add that they hope that further use will be made of this method in order to test whether female hormone is a real specific for hæmophilia.

The question now naturally arises, if female hormone will do this in one sex-linked recessive disease, can it be expected to be of help in other such diseases. Hunting through the literature, I encountered the work of Wibaut[3] who, apparently following the same line of reasoning, had tried female hormone (menformon), in cases of sex-linked recessive retinitis pigmentosa. He tried injecting weekly 40 mouse-units into a man who had this disease. Two brothers were badly affected and a sister very lightly affected. He got no results and discontinued the injections. Later he found that Snapper in Amsterdam, arguing along the same line, had administered rather large doses of menformon in thrombo-angiitis obliterans with very favourable results. This is a disease which is largely confined to the male sex, because it is sex-linked recessive in character. Stimulated by Snapper's results, he again tried his therapy on his original patient, using much heavier doses. He administered 100 mouse units daily. The following is a brief but graphic record of the improvement. The man was a gardener until 1926, when this illness came upon him. By 1928 he was so blind that he was compelled to learn to read Braille. On March 16, 1931, one week after the beginning of the injections, he could read again; a few days later he was able to go unaccompanied on the street in daylight; and by March 30 he was able to go out alone at night. For the first time in many years he could see the stars in the sky. Thus in a matter of a few weeks he had been snatched from darkness back to light. Wibaut, encouraged by this, tried the same treatment on the other two brothers. They were somewhat benefited, although improvement was not comparable to that shown by the first brother. Two other patients were injected, one with no improvement whatever, and one with slight improvement. Both were cases of long standing.

These two reports seem to point to the fact that the female hormone is not a specific for any one of the sex-linked recessive diseases, but supplies that inhibiting influence to the male which he lacks but which permits the carrier female to appear normal, despite the fact that she too has the chromosome bearing the ill-fated determiners for the disease. By giving the affected male that additional resistance, he is able to suppress the disease tendency.

Such work demonstrates the value of a knowledge of even the most theoretical aspects of heredity. It opens up a new field as regards the numerous sex-linked diseases. Since Birch showed that the affected male in hæmophilia lacked the normal sex-hormone in the urine, it may be that all males who have one of the many sex-linked diseases would show the same absence of sex-hormone in the urine. Thus in optic atrophy, in colour blindness, or in muscular dystrophy limited to the males, it could be determined whether the male lacked the female hormone in the urine, and by actual trial, if an intensive course of ovarian therapy would benefit him. The sooner the disease was treated, as for example in retinitis pigmentosa or optic atrophy, the better would be the chance of obtaining results. One cannot expect to restore completely atrophied nerve cells, but one may be able to arrest the process in cells that are just beginning to show changes. It is to be hoped that this therapy will be carried out, and the results reported on other cases and other types of sex-linked recessive disease.

One more word must be said here. Heretofore, one could not determine in sex-linked recessive diseases who was a carrier female, except in the case of daughters of an affected father. All such women are carriers. When the line of descent was through an unaffected carrier female to her daughters, some of whom were wholly normal, others of whom like their mother were carriers, it became necessary to warn all such daughters not to have children, since it could not be shown whether they were carriers until they had had sons who developed the disease, a proof that was disastrous, since it left

affected males in its trail. Birch has now found something that may prove of help in this matter, although she made no such interpretation of her own results. She found that the urine of two female transmitters of hæmophilia also lacked the female hormone. Apparently this recessive trait of hæmophilia is able to inhibit the manufacture to some extent of the female hormone, even in a female with a normal sex chromosome, provided she carries also an affected sex chromosome. We are led to assume that it does not inhibit hormone-formation completely, since the female has enough to keep her from being a hæmophiliac. If Birch's work is confirmed with respect to hæmophilia, and if it should be also shown in other sex-linked recessive diseases that the female carrier lacks the hormone in her urine, while the non-carrier normal females in the family possess it, we should have a means of determining who are the carriers. In this way, only such females as have no sex-hormone in their urine need refrain from reproduction. The others would be normal and incapable of passing on the defect.

Certainly such suggestions are worth careful verification, for they will have profound effect, not only upon the treatment of these sex-linked diseases but upon the ability to forecast the families in which these diseases are apt to occur. This spectacular therapy which holds so much promise originated purely because these physicians knew of the laws governing the inheritance of sex. Heredity was the magic key, the "Open Sesame" that unlocked the doors guarding the secrets of Æsculapius. It might be said that this mode of treatment could have been devised without the knowledge of inheritance of sex. To that we can answer that it might have been, but it was not.

These two examples are only a few of the many "tips" that heredity gives the modern physician. Enumeration of all of them would mean too lengthy an article; some of them may be found in other of my articles dealing with the importance of heredity in the field of preventive medicine and public health. Those interested in human heredity have been looked upon as faddists, or as propagandists with interesting material at their command, but with nothing of practical value to appeal to the practitioner. Heredity as an implement in the armamentarium of the physician is coming into its own. No graduate of medicine can hope to keep abreast of the times unless he becomes acquainted with the field of genetics as it applies to medicine, and incorporates its principles into his daily thought and practice. To this end, a course in medical genetics, taught in the final year of medicine, by a person trained in medicine, and conversant with genetics should be included in the curricula of all medical schools.

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DETECTION OF BLOOD IN THE ABDOMEN.—R. A. Lifvendahl describes a sign for the detection of small amounts of free blood in the abdomen. It it emphasized that the obtaining of an accurate history and the careful conduct of the physical examination are of more value than all of the so-called pathognomonic signs yet described—such signs being always in the nature of confirmatory evidence. By correlating the clinical manifestations indicating peritoneal irritation (painful defæcation, pain on manipulation of the cervix, urinary disturbances, lower abdominal and later high abdominal pain, thoracic and shoulder pain) the author deduces that such signs are entirely due to the local irritating effect of the blood on the peritoneum, the pain varying in position according to the level which the hæmorrhagic exudate has reached. The period of greatest diagnostic difficulty occurs when there are small amounts of free blood in the pelvis following the rupture of the tube, for it is at this point that all the previously mentioned evidence of peritoneal irritation confuses the diagnosis; such signs may be due to other causes, such as inflammatory conditions. In this early stage the patient usually localizes the pain in the lower part of the abdomen, either to the right or the left of the mid-line, or occasionally in the suprapubic region. If now the patient is rotated to the opposite side to that on which the pain is located, from her back on to her iliac crest, it will be observed that the subjective and objective signs have shifted to the dependent portion of the lower abdomen after a period of five to ten minutes. In other words, the position of the blood and the region of peritoneal irritation have been shifted concurrently. This test can only be expected to be positive when there is a moderate amount of free blood in the abdomen. It cannot occur, of course, when the entire peritoneum is irritated by an abdomen full of blood, nor when there is such a small amount of blood that it cannot be shifted. Two case histories are given illustrating this sign. One of these indicates that the sign may be of value in differentiating between an early ruptured ectopic pregnancy and appendicitis.—*Am. J. Obst. & Gynæc.*, September, 1932, p. 394. Abs. in *Brit. M. J.*

SOLANUM TUBEROSUM*

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POTATO is the well known crop plant recognized botanically as *Solanum tuberosum*, and of the 1,200 species in the genus less than a dozen have the property of forming tubers. Wild potatoes have been found in Chile and Peru, but the plant was certainly cultivated by the inhabitants before the arrival of the Spaniards, who found it under cultivation in the neighbourhood of Quito. In the Cronica de Peru of Pedro Creca (Seville, 1553) the potato is mentioned under the name "battata" or "papa". Hieronymus Cardan, a monk, is supposed to have been the first to introduce it from Peru into Spain, from which country it passed into Italy and thence into Belgium. Carl Sprengel states that the potato was introduced from Santa Fé into England by Sir John Hawkins in 1563, but according to Sir Joseph Banks, the plant brought by Drake and Hawkins was not the common English potato, but the sweet potato. At the time of the discovery of America, we are told by Humboldt, the plant was cultivated in all the temperate parts of the continent from Chile to Columbia, but not in Mexico. In 1585 or 1586 potato tubers were brought from what is now North Carolina to Ireland, on the return of the colonists sent out by Sir Walter Raleigh, and were first cultivated on Sir Walter's estate near Cork.

The cultivation of the potato in England for a time made but little progress, even though it was strongly urged by the Royal Society in 1663; and it is only comparatively recently that its cultivation on a large scale has become general. The slow acceptance of the potato in the diet of man is a striking example of the conservative instinct in feeding. Ireland is particularly suitable for the growth of the potato and her people consume an enormous amount of this vegetable.

The potato blight appeared in North America in 1844; it reached Europe in 1845, attacking Belgium, Hungary, Germany, Holland and the United Kingdom. The United Kingdom felt its worst effects, scarcely a district escaping; 1846 and 1847, especially the latter were the worst years. In a few weeks the abundant potato harvests in Ireland became a waste of putrefying vegetation. The British Government took active measures to relieve the distress. Great doles of maize were given out. In 1846 as many as 285,000 hands were employed on relief work and in 1847, 734,000. The Government imported in the first six months of 1847, 2,849,508 quarterns of maize, worth, at the then current prices, nearly £9,000,000, a great part of which was distributed gratis. The United States sent substantial supplies across the Atlantic. Nevertheless, there were many deaths from sheer starvation. The total Irish mortality for the five years ending in 1851 was close upon one million out of a population of about eight million.

The above facts are convincing proof of the important dietetic position held by the simple potato.

When the young tubers are exposed to light they become green and are acrid to the taste and develop solanine, a poisonous chemical substance. The ripe tuber in section shows an outer cork skin, or periderm, a thin cortical layer, bounded internally by a ring of vascular bundles, and a thick medulla divided into an external and an internal portion. The internal medulla is usually star-shaped and is poorer in starch and richer in water. This composition naturally changes with the variety and in part with the conditions of growth. The Table given here (see p. 399) has been compiled from various sources. It convincingly demonstrates the important food constituents of the potato.

Potatoes contain about 75 per cent of water; 12 to 15 per cent of starch; and from 2 to 2.5 per cent of protein material, together with a small amount of ash. The normal potato contains only a small quantity of sugar (about

* Read at the annual meeting of the Canadian Society for the Study of Diseases of Children, Lucerne-in-Quebec, June, 1932.

0.3 per cent), but exposure to frost markedly increases this amount, as is demonstrated by the sweetness of frosted potatoes which is familiar to all. The desirable quality of a potato to us is its capacity to develop mealiness on boiling, and this largely depends on the amount of starch. In France, however, potatoes are rarely boiled in water, but usually cooked in fat; hence there is a demand for a different type of potato, with a firm yellow flesh, becoming not "mealy" but "soapy" on boiling. Such a potato is usually lower in starch and higher in nitrogen content.

The potato contains a minimum amount of vitamin B. Its chief vitamin value has to do with C. For years G. F. Still has cured cases of infantile scurvy with so called "potato cream," and in 1915 A. F. Hess cured infantile scurvy with ordinary mashed potato, made into a gruel and used instead of cereal. Potatoes, while containing the antiscorbutic vitamin in distinctly lower concentration than do oranges, lemons, and tomatoes, are yet of great importance as antiscorbutics because of the quantities in which they are consumed. A. F. Hess (1925) estimated that in the countries of the temperate zone the consumption of potatoes is probably twice that of all other vegetables combined, and that for this reason our protection from scurvy rests very largely upon the potato. "Therefore, if this crop fails, scurvy will develop in the Spring." Weight for weight, cooked potatoes are comparable as antiscorbutics with apples and bananas, and contain approximately one-fourth of the concentration of vitamin C which is found in oranges and lemons. Given and Cohen (1918) reported a number of experiments with potatoes cooked in different ways and in some cases dried before feeding. The amount of vitamin C present varied under these different circumstances. Recent work suggests that the antiscorbutic vitamin is closely connected, if not identical, with narcotine, and this alkaloid has been found in large amounts in potatoes.

THE POTATO IN INFANT FEEDING

In infant feeding the potato has usually been withheld until about the beginning of the second year. In view of the fact that it possesses some obvious qualifications superior to cereal, such as some antiscorbutic quality (about one-quarter that of orange juice) and the presence of an abundant cheap supply during the depression (50 to 60 cents per bag of 80 lbs.), it occurred to us that its more general employment as a substitute for cereal in infancy might alleviate the suffering of the poor.

During the last six months at the Montreal Foundling and Baby Hospital twelve babies, varying in age from six weeks to six months, have been fed on diets containing a large amount of baked potato. The Green Mountain potatoes from New Brunswick were used for our feeding experiment, and from November 1, 1931, to May 1, 1932, were furnished at an average of forty-five cents per bag (80 lbs.). They were baked in their jackets in the oven of an ordinary large coal range. The morning supply was in the oven from 9.30 a.m. to 11.30 a.m., and those used in the afternoon from 2.30 p.m. to 4.30 p.m. During this time water

TABLE

COMPARISON OF POTATO, OATMEAL, MEADS CEREAL AND FARINE, IN TERMS OF PERCENTAGE

	Protein	*Fat*	*Carbohydrate*	*Ca.*	*Mg.*	*K.*	*Na.*	*Ph.*	*Cl.*	*S.*	*Fe.*	*Cu.*	*Calories per oz.*	*Cost per lb.*
Potatoes (E.P.)	2.2	.1	18.4	.014	.028	.42	.02	.058	.038	.030	.0013	.00017	23.5	cents ½
Meads	15.0	3.0	71.8	.78				.062			.024	.0013	109	25
Meads (E.P.)	2.5	.50	11.9	.13				.010			.004	.0002	18	4¼
Oatmeal	16.1	7.2	67.5	.069	.110	.34	.06	.392	.069		.00096	.0005	112	4¼
Oatmeal (E.P.)	2.7	1.2	11.25	.013	.018	.06	.01	.065	.011		.00016	.00008	19	⅔
Farine	11.0	1.4	76.3	.021	.025	.120	.065	.125	.076		.0008		103	10
Farine (E.P.)	1.9	.23	12.7	.003	.004	.02	.011	.021	.013		.0001		17	1⅔

Potatoes boiled or baked without dilution. Cereals diluted by adding five (5) parts of water to one (1) part of cereal.
E.P. = edible portion.

was always kept at the boil on the top of the stove. Immediately before feeding the potatoes were opened and as much as possible of the potato flour removed.

The following rules were observed:—

1. Modified boiled whole milk formulæ with the addition of sugar were employed.

2. Every infant received daily one dessertspoonful of Mead's 10D cod liver oil.

3. Potato flour was offered twice daily *ad lib.* (No orange juice or other antiscorbutic was given).

4. Syrup Ferro-Catalytic (Frosst), one dessertspoonful daily, was given to prevent the development of food anæmia.

No unusual discomfort or diarrhœa or vomiting was observed. No scurvy has as yet made its appearance. One infant seemed irritable and early scurvy was suspected, but x-ray photographs yielded quite negative results. Frequent blood counts have failed to demonstrate anæmia, and on a practically iron-free diet the administration of one dessertspoonful per day of Frosst's Syrup Ferro-Catalytic seemed to provide an adequate and palatable amount of iron and copper. This study is being continued, and it is hoped will result in a further publication concerning especially this point.

In the beginning of the experiment some of the infants that had been fed cereal seemed disinclined to take the potato, but a few days' perseverance by the nurses soon resulted in the consumption of potatoes in large amounts. The potato was always moistened with boiled milk, as is the case with cereal. According to the nurses, infants that had never taken cereal accepted the potato with about the same degree of enthusiasm as is usually seen with cereal. The earliest age at which potatoes were fed was six weeks, and the greatest amount of potato consumed by a single infant in one day was fifteen tablespoons, and the average amount six tablespoons.

CONCLUSION

Potato can be satisfactorily substituted for cereal in infant feeding; and, when used in about the same amount as cereal is ordinarily employed, prevents the occurrence of scurvy.

The following case reports are representative of those of 12 infants who up to this time have received the feeding described.

CASE 1

I. W., aged 4½ months, weighing 12 lbs. 8 ounces, was fed on the potato diet described above from November 22, 1931, to May 10th, 1932. The infant suffered from an attack of pyelitis in the latter part of February and beginning of March, during which time the potato diet was discontinued. The infant lost weight during the attack of pyelitis, but quickly regained on resumption of the potato diet. The average gain was 5½ ounces per week. On May 10, 1932, the following record was made: height, 28 inches; weight, 21 lbs. 8 ounces; six teeth; the child sits without support; physical examination essentially negative.

Blood.—December 9, 1931, red blood cells, 4,010,000 per c.c.; hæmoglobin, 75 per cent (T). May 14, 1932, red blood cells, 4,690,000 per c.c.; hæmoglobin, 80 per cent (T).

CASE 2

A. B. F., aged 4 months, weighing 13 lbs. 6 ounces, was fed on the potato diet described above from December 16, 1931, to May 10, 1932. The infant suffered from a recurring otitis media, otherwise its course was uneventful. The average gain was 4 – ¾ ounces per week. On May 10, 1932, the following record was made: height, 28½ inches; weight, 20 lbs.; four teeth; the child sits without support; physical examination was essentially negative, except for otitis media.

Blood.—December 9, 1932, red blood cells, 3,450,000 per c.c. May 14, 1932, red blood cells, 4,080,000 per c.c.; hæmoglobin, 80 per cent (T).

CASE 3

P. B. M., aged 3 months, weighing 11 lbs., 14 ounces, was fed on the potato diet described above from December 14, 1931, to May 10, 1932. The infant suffered from cervical adenitis in January; otherwise the course was uneventful. The average gain was 6½ ounces per week. On May 10, 1932, the following record was made: height, 26¼ inches; weight, 20 lbs. 6 ounces; physical examination was essentially negative.

Blood.—December 14, 1931, red blood cells, 4,300,000 per c.c. May 14, 1932, red blood cells, 4,400,000 per c.c. hæmoglobin, 90 per cent (T).

CASE 4

T. M. M., aged 7 weeks, weighing 9 lbs. 12 ounces, was fed on the potato diet described above from March 15th to May 10th. During this time the infant made uneventful progress. The average gain was 9 ounces per week. On May 10, 1932, the following record was made: height, 25½ inches; weight, 14 lbs. 10 ounces; physical examination was essentially negative.

Blood.—March 18, 1932, red blood cells, 3,420,000 per c.c.; hæmoglobin, 80 per cent (T). May 14, 1932, red blood cells, 4,150,000 per c.c.; hæmoglobin, 85 per cent (T).

FINDINGS OF SPECIAL CLINICAL INTEREST REVEALED AT POST-MORTEM EXAMINATIONS*

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THE close association of the clinical pathologist with the clinician in autopsy work is of mutual advantage. To the pathologist it serves as a continuous source of interest and information; to the clinician it gives opportunity for the correlation of pathological processes and clinical evidence, and for the development of his skill in differential diagnosis. The pathologist who first familiarizes himself with the clinical manifestations will, in most cases, be able to mentally anticipate his actual findings, but, no matter how extensive his experience, he will at times discover conditions which will surprise both himself and his clinical confrère. Occasionally, the lack of definite findings may puzzle even the most experienced workers. The discovery of the unusual in autopsy work has more than a scientific or academic interest. It has a decided value in that it constantly broadens the physician's mental grasp of the scope of human disease processes, and thereby vastly improves his capacity for differential diagnosis. The post-mortem findings in any given case may usually be related to a single etiological factor, be it anatomical, bacterial, chemical or metabolic, but it must not be forgotten that occasionally more than one sequence of pathological events may be present.

The title of this paper was suggested by a review of about 1,800 autopsies performed at the Hamilton General Hospital in the last thirteen years. The cases quoted were chosen for some unusual feature, and time forbids reference to more than a few. My experience, similar, I presume, to that of most pathologists, has been that, while experience constantly reduces the number of inexplicable cases, yet, periodically, one encounters cases in which, even after the most careful and comprehensive study, it is impossible to definitely state the cause of death. We, as yet, know very little of what happens at the actual moment of death, and there must be cases of sudden derangement of the physical, electrical, or biochemical make-up of the body, in which the tissue changes cannot be appreciated by our more or less gross methods of study.

Many interesting findings occur in the examination of the alimentary system. The presence of diverticula in various parts of the tract is often of clinical significance. A diverticulum of the œsophagus, capable of holding four cubic centimetres of fluid, caused underestimation of the degree of narrowing in a stricture of that organ. In two cases, diagnosed radiologically as duodenal ulcer, diverticula of the duodenum were responsible for the diagnosis. In another case general peritonitis resulted from the perforation of a Meckel's diverticulum by a small sharp piece of bone which had apparently been swallowed with food. Diverticula of the colon often occur without clinical significance. At other times, they become infected and set up a severe colitis, and one case of chronic inflammatory change in an infected diverticulum was diagnosed as a carcinoma. Polyps are not infrequently encountered. They occur in the stomach, as a rule without symptoms. A polyp of the duodenum, 3 cm. in diameter, was discovered just outside the pylorus in a case giving periodic symptoms of bile-duct obstruction. In several cases of colitis with severe dysenteric symptoms the presence of multiple polyps of the colon was disclosed at autopsy. Some of them had ulcerated, and severe infection of the surrounding mucosa had followed. The relationship of polyps to the development of carcinoma of the colon has been noted in a few cases.

In one case of a young woman, with hæmorrhage from the bowel extending over a week, a diagnosis of typhoid fever was made and death was attributed to hæmorrhage from ulcers of the small intestine. At autopsy, the appendix was found to be ulcerated and imbedded in a mass of old adhesions, and in the centre of this

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mass was a short, rusty pin. The appendicular artery had been eroded, and the lumen of the appendix, still patent, had served as a drainage tube, through which the escaping blood had poured into the cæcum and large bowel. Early operation would have saved this life.

A soldier in Macedonia, convalescing from malaria, fell from his horse and died within twenty-four hours from shock and collapse. The spleen, at autopsy, was found to have ruptured across the middle part, and it weighed in the neighbourhood of 2,000 grm., the splenomegaly being attributable to repeated attacks of malaria. In two cases, acute hæmorrhagic pancreatitis has been an unexpected finding. In an infant showing symptoms suggestive of pyloric stenosis deficiency of the left crux of the diaphragm was found, with rotation of the stomach, spleen, and part of the small intestine into the left pleural cavity. Two cases of inverted viscera occurred, one of which had been diagnosed radiologically. In neither case was the finding of definite clinical significance, nor had it any apparent relationship to the cause of death.

In the circulatory system one finds from time to time conditions which do not easily lend themselves to ante-mortem diagnosis. In the case of congenital heart abnormalities found in infants, a general diagnosis of congenital heart lesion is usually made if the infant lives more than twenty-four hours. Cases of defective ventricular septum and of coarctation of the aorta were seen in this series. A case of sudden death in a girl of 17 years under intensive arsenical antiluetic treatment revealed at autopsy an hypertrophied heart, with extreme fatty degeneration, the muscle having the gross appearance of putty. In another case, a girl, fourteen years of age, died so unexpectedly and suddenly that poisoning was suspected. She had been in apparent health, but investigation of her history revealed the fact that between the ages of six and twelve years, she had suffered attacks of at least five infectious diseases, *viz.*, diphtheria, scarlet fever, measles, chicken-pox, and whooping cough. At autopsy sclerosis and thrombosis of the left coronary artery were found. The age of this patient made the finding one of considerable interest. Two cases in which death was caused by aortic stenosis with cardiac hypertrophy, were noted. Cases of sudden death from aortic stenosis have been reported by various authors. Here death may be due to a sudden derangement of the conducting system of the heart consequent upon hypertrophy and fibrosis. Gross sub-endocardial hæmorrhages have in my experience been observed in (a) cases of direct trauma to the chest in the cardiac area, in (b) cases of purpura, and in (c) cases of benzol poisoning. This type of hæmorrhage has been a striking feature in several cases of benzol poisoning which have come under my view.

Thrombosis of veins, with consequent pulmonary infarction, is, as a rule, not difficult of ante-mortem diagnosis. In one case an extensive pelvic operation had been performed. Convalescence was apparently satisfactory, and on the day previous to discharge death suddenly intervened. At autopsy, the internal iliac vein was filled with a thrombus and there were thrombi in the lower part of the inferior vena cava. In the right heart, coiled up like a large worm, was found about 8 inches of clot which had embarrassed the heart's action, and parts of which had floated off, causing infarction of branches of both pulmonary arteries.

In the respiratory system, collapse of the lung is an occasional finding which causes surprise. This is of greatest interest in cases of unexpected death under an anæsthetic, and occasionally the problem of its etiology gives great concern to those engaged in the operation. A sudden œdema of the lungs, which is a terminal thing in many conditions, does sometimes account for death in cases of shock where death is not expected. The osmotic balance between the alveolus of the lung and the inter-alveolar fluids is apparently a delicate thing, much more easily upset in some people than in others. In children and infants dying of pneumonia one is struck by the small amount of involved lung tissue which can apparently account for death. One is also struck by the rapidity with which death may come in cases of pneumonia of the hæmorrhagic or influenzal type. The pathological appearance of the lung in influenzal pneumonia, broncho-pneumonia and lobar pneumonia shows striking characteristic differences.

One interesting case of angioneurotic œdema recently came to autopsy. A young man in his early twenties had since the age of seven suf-

fered from periodic attacks of what was diagnosed as angio-neurotic œdema. During this time he had suffered from suppurative otitis media and during the last five years had complained of chest pains, cough, and increased sputum. The tubercle bacillus was never found. He finally developed an œdema of the larynx, and tracheotomy gave him only temporary relief. He died shortly after. At autopsy, the œdema was found to have involved his tracheal mucosa so as to completely occlude the lumen. Scattered throughout the lungs were a number of small abscesses, none over 1 cm. in diameter, the lung tissue itself being markedly œdematous. This appears to have been a case of allergy to the streptococcus which was isolated from the ear discharge and from the lung abscesses.

The genito-urinary system provides some interesting findings, some of them with important clinical significance. The usual anomalies, such as horse-shoe kidney, single kidney and multiple ureters, are seen at intervals. The occurrence of a fulminating attack of uræmia, especially in the case of adolescents who have a history of a mild attack of scarlet fever, has been noted twice. In each case, extensive nephritic changes were present which had been previously unsuspected. In one patient dying of uræmia two congenital cystic kidneys of moderate size were found, both of which had become attacked by an ascending infection. Both kidneys had a minimal amount of functioning kidney tissue, and this tissue had been quickly put out of action by the inflammation following the infection.

Another very interesting case was that of a man of middle life, who, one year before coming to autopsy, developed an adenocarcinoma of the right mastoid, the diagnosis being established by biopsy. As it was the only case of carcinoma of the mastoid in my experience, I considered the possibility of it being primary there. At autopsy, however, a nodule of adenocarcinoma in the right kidney, 1 cm. in diameter, was found, and a similar smaller one in the left kidney. These nodules were histologically similar to the mastoid lesion, and the conclusion necessarily was that the mastoid lesion was secondary to a primary adenocarcinoma of the kidney.

Uterine hæmorrhage was held responsible for the death of a patient who had had a difficult labour one week previous, and in whom delivery resulted in an extensive tear. Autopsy showed the development of an abscess of the left side of the pelvis which had eroded the branch of the internal iliac artery on that side, causing a gross hæmorrhage, with escape of the blood from a recto-vaginal fistula which had resulted from the tear.

Lesions of the nervous system provide interesting material at times. Two cases of cerebral hæmorrhage in young men in their twenties revealed at autopsy the presence of hæmorrhages into old cysts, in both cases in the frontal lobe. Lues was not a factor in either case. These cysts may, no doubt, have been congenital, or they may have resulted from hæmorrhages into the silent area at birth or in infancy. A case of myelitis in an elderly person with negative spinal fluid findings was found to be due to a tuberculous sub-periosteal lesion of the body of one of the vertebræ, which had caused a gradual pinching pressure on that part of the cord.

The question of status thymico-lymphaticus is still a somewhat vexed one. A young man in the course of his work cut his thumb and was taken to the nearest doctor's office, where the doctor undertook to put a stitch in it. Upon the insertion of the needle, the patient, who was 17 years of age, apparently fainted and all efforts failed to resuscitate him. Autopsy showed the text-book findings of this condition, *viz.*, a thymus of twice normal size, great hyperplasia of lymphatic tissue, especially of the mesentery and cæcum, and hypoplasia of the aorta. The puzzling thing about this case is the fact that some die in infancy, while others apparently survive until about the age of twenty. Recently, I autopsied an infant who died apparently of suffocation mechanically caused by a large thymus, but in whom the other evidences of status lymphaticus were absent.

In 1931, there came to autopsy at the Hamilton General Hospital, a patient who had been in hospital for about three months, and whose case had been diagnosed as one of hyperthyroidism. He ran an almost normal temperature, a systolic blood pressure in the neighbourhood of 200 mm., a practically normal blood chemistry, a basal metabolic rate of from +61 to +76, and the Wassermann reaction was negative. The administration of iodine had no effect. There was no enlargement of the

thyroid. He finally died of pneumonia and at autopsy a capsulated adrenal tumour, 6 cm. in diameter, of the chromaffinoma type was found, and a heart weighing 790 grm. His clinical symptoms were accounted for apparently by the presence of the tumour which showed no metastases. The thyroid gland was normal in size and in histological appearance.

Cases of death within 48 hours from slight injuries which become infected with streptococcus occur occasionally. In these cases, one finds a little pus around the wound, but no marked tissue reaction. Cultures at the site of injury usually show the presence of the organism, and occasionally it may be isolated from other parts of the body. These cases are sometimes hard to explain to lay juries. The problem of the balance between virulence and resistance is involved here and it may be that the question of allergy should also be given consideration.

The cases quoted above comprise a few of the more unusual findings in this series of autopsies, some of which have been reported in a previous paper.[1] Many of them are, no doubt, not unusual findings to those with a greater autopsy experience. The exchanging of experiences, however, helps to increase the sum total of our knowledge, and I think that most pathologists will agree that in autopsy work, one is apt always to encounter lesions just a little different, no matter how great one's experience.

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SPINAL ANÆSTHESIA*

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SPINAL anæsthesia was first advocated by Corning in 1885, but the method did not meet with much recognition by members of the medical profession until procaine was discovered in 1904. The method has had brief periods of popularity, but it was not until the use of ephedrine became general that spinal anæsthesia gained wide acceptance. During 1929 and 1930 the peak of the present wave of popularity was reached. The trend of opinion regarding the methods employed and results obtained has since become critical. Questions regarding the physiological changes produced by blocking the roots of spinal nerves have arisen, and unfortunately few of them can be satisfactorily answered. Conflicting theories have been evolved, and different methods of producing spinal anæsthesia based on these theories have been developed. Comment here will be limited to the method that is employed at The Mayo Clinic.

THE CHOICE OF CASES FOR SPINAL ANÆSTHESIA

Because many points regarding the physiology of subarachnoid block are not well understood it has remained for experience, based on large series of cases, to show that the method should not be used indiscriminately but should be reserved for certain types of cases. At The Mayo Clinic the use of spinal anæsthesia is limited to operations below the diaphragm. The method is indicated particularly for patients suffering from emphysema, advanced asthma, chronic bronchitis, bronchiectasis, and other respiratory diseases, for whom it is essential that reflexes be rapidly recovered and for whom a general anæsthetic given by inhalation is contraindicated. Patients suffering from diabetes may be operated on under spinal anæsthesia without remote untoward effect, provided the usual precautions are taken preoperatively and postoperatively to control the metabolism of carbohydrates. Because a few centigrams of the drug have so little effect on the general cellular metabolism, spinal anæsthesia is indicated in cases in which the kidneys are not functioning properly and in which a general anæsthetic, given by inhalation, is contraindicated. Patients suffering from intestinal obstruction may be operated on successfully after the administration of a spinal anæsthetic. Gastric lavage, followed by evacuation of the liquid

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content of the stomach immediately before the patient comes to the operating room, is advised. The likelihood of vomiting copious amounts of material is eliminated to a great extent, and aspiration of particles within the trachea and lungs is thus prevented. For patients suffering from intestinal obstruction, who are debilitated and dehydrated, abdominal block, supplemented by inhalation of ethylene and oxygen, rather than spinal anæsthesia, is advised. Aside from these conditions, the decision of whether to use spinal anæsthesia depends on the degree of relaxation considered necessary for successful completion of the operation. The method has been found useful for hysterectomy, the removal of tumours within the broad ligament, and removal of large ovarian cysts.

CONTRAINDICATIONS

1. The procedure is contraindicated in the presence of involvement of the central nervous system by a tumour of the spinal cord, syphilis, epilepsy, and intracranial or intraspinal hæmorrhage. Patients suffering from pernicious anæmia or subacute combined degeneration of the spinal cord should not be given a spinal anæsthetic. Subsequent involvement of the spinal cord, due to progress of the disease, might be attributed to the procedure.

2. Patients whose blood pressure is extremely high generally experience marked reactions following the induction of spinal anæsthesia, and for them the dose used must be conservative. Many persons have normally low blood pressure, and spinal anæsthesia in such cases does not entail greater risks than for patients who have a normal blood pressure. Patients with hypotension, (a systolic blood pressure of 100 mm. of mercury or less), who constitute poor operative risks, especially if decompensation is present and if cyanosis is evident, do not tolerate spinal anæsthesia well. For them the method should not be used for operations above the lower part of the abdomen, unless a general anæsthetic is contraindicated. In any case, the dose of procaine should be minimal. For patients whose systolic blood pressure is 90 mm. of mercury or less anæsthetic procedures other than subarachnoid block are advised.

3. Patients in a state of shock constitute poor risks for any form of anæsthesia. If the shock is not of hæmorrhagic origin spinal anæsthesia may be used and is satisfactory when the shock has been due to occurrence of intussusception or volvulus, or when an ovarian tumour becomes twisted on its pedicle. In some instances, due to the breaking of the reflex arc, shock may be partially controlled by the anæsthesia.

Burch, Harrison and Blalock[2] reported that hæmorrhage in association with spinal anæsthesia is much more likely to cause shock than the same loss of blood under ether. Under ether anæsthesia, withdrawal of blood equal to 3 or 4 per cent of the weight of the body produced marked decline in cardiac output and blood pressure of dogs, but the animals were not in grave danger of immediate death. Under spinal anæsthesia death was produced by removing an amount of blood which varied from 0.5 to 1.6 per cent of body weight, because the vasoconstrictor mechanism which normally compensates for hæmorrhage is disturbed. The method is contraindicated if patients have lost a large amount of blood, or if severe loss of blood during operation is anticipated.

4. For patients with diminished breathing capacity due to pleural effusions or intrathoracic tumours, combined with a lowered concentration of hæmoglobin, spinal anæsthesia is contraindicated.

5. Superficial infection over the area through which the spinal needle would be inserted precludes the use of the method. Patients suffering from septicæmia should not be given a spinal anæsthetic because infection might be carried within the dura.

PRELIMINARY MEDICATION

Administration by mouth of pentobarbital sodium, 1½ or 3 grains (0.1 or 0.2 g.), the evening previous to operation assures the patient of a night's rest. The patient's susceptibility to the action of the drug may be gauged, and decision regarding the preliminary medication to be given the morning of operation is thus facilitated. One hour before operation, 1½ or 3 grains of pentobarbital sodium may be given by mouth and morphine sulphate in a dose of 1-6 to 1-4 grain (0.01 to 0.016 g.) is given hypodermically. If it is intended that the spinal anæsthesia be supplemented by a general anæsthetic, atropine sulphate, grain 1-200 or 1-150 (0.003 or 0.004 g.), may be given with the morphine. If, however, the patient is suffering from abdominal distention, atropine is probably best omitted because it interferes with the function of the myoneural juncture of nerves which supply unstriated muscle fibres. The line of vagal

innervation is thus broken, and contraction of the intestines is rendered difficult even after the inhibitory sympathetic innervation is paralyzed following subarachnoid block.

Ephedrine.—Ockerblad and Dillon[8] were the first to advocate the use of ephedrine in spinal anæsthesia. The drug is now well recognized by many as a useful adjunct to spinal anæsthesia. Labat,[6] however, is of the opinion that "the injection of ephedrine or any other hypertensive drug is useless, occasionally harmful." Saklad[10] is of the opinion that a fall in blood pressure is of no serious consequence if the patient is kept in the Trendelenburg position. He maintains that ephedrine, by its power of accelerating the heart, places the patient in a condition approaching circulatory exhaustion. Chen and Schmidt[3] found that large doses depress the cardiac musculature and cause a fall in blood pressure. Burch and Harrison[1] showed by experiments on dogs that the initial change in spinal anæsthesia is reduction in arterial pressure. This vasodilatation may involve the unanæsthetized as well as the anæsthetized region. Venous return and cardiac output are affected secondarily. Since it is peripheral resistance that is primarily affected, it may be argued that vasoconstrictor drugs should be useful in maintaining blood pressure during spinal anæsthesia. At The Mayo Clinic evidence of circulatory injury attributable to ephedrine has not been noted when the dose is limited to that sufficient to maintain or restore the blood pressure to a normal level. The blood pressure may fall after administration of a spinal anæsthetic, in spite of ephedrine having been given, but it is felt that the reduction is not so great as it otherwise would be. The pressure is prevented from approaching the critical level at which circulation to vital organs becomes inadequate because of marked reduction in the cardiac output. In order to avoid any deleterious effect on cardiac action, the administration of ephedrine is limited to one dose, not exceeding 75 mg., either prior to introduction of the anæsthetic agent or immediately after. To patients who exhibit a decrease in blood pressure subsequently, epinephrine is given.

If the patient's blood pressure is normal, a hypodermic injection of 25 or 50 mg. (3-8 or 3-4 grain) of ephedrine is given ten minutes before the introduction of the anæsthetic agent. If the blood pressure is 160 mm. of mercury or higher it may be desirable to delay injection of ephedrine until the lumbar puncture needle has been inserted and the procaine injected. Thus, if it should appear that the procedure could not be successfully completed, one would be guarded against unduly raising the blood pressure. If the systolic blood pressure is less than 100 mm. of mercury, it is advisable to give 50 mg. of ephedrine twenty minutes before the spinal anæsthetic is introduced; unless there is some response to the hypertensive drug the dose of procaine should be minimal.

PROCAINE (NOVOCAINE, NEOCAINE ETC.)

The dosage of procaine depends on several factors. The patient's blood pressure, age, weight and height must be considered. An estimate of the patient's resistance in relation to his primary disease and in relation to any complicating disease from which he may suffer is made. These factors, together with the site and possible duration of the operation should guide in deciding on the dose of procaine. From 1 to 1.5 mg. of procaine for each pound of body weight, with a maximal dose of 200 mg., is a reliable guide. The smaller doses should be given to old and debilitated patients who are affected by hypotension, cardiovascular disease, recent extreme loss of weight, or lowered concentration of hæmoglobin with attendant decrease in the power of the blood to carry oxygen.

METHOD OF ADMINISTRATION

Formerly it was the practice at The Mayo Clinic to use crystals of procaine dissolved in spinal fluid. In order to simplify the method, procaine in 10 per cent solution (100 mg. in each c.c.) in physiological solution of sodium chloride has been used since October, 1931, with equally good results. The remainder of the bulk of liquid to be injected is composed of aspirated spinal fluid. It is recognized that there are many factors over which little control can be exerted that influence the final destination of a drug when introduced into the dural sac. Among these are the rate of circulation of the spinal fluid, the spinal fluid pressure, the presence of lordosis or scoliosis, the size of the nerve roots, and a possible partition effect of the dural sac in those cases in which the ligamentum denticulatum forms a fairly complete curtain.

There are, however, many factors over which control is possible and which may be varied in order to obtain anæsthesia of a desired level. At The Mayo Clinic all injections are given while the patient is lying on the side on a cart or operating table. Control of duration and of

extension cephalad of anæsthesia is achieved by varying the dose of procaine and the amount of spinal fluid with which it is diluted. The site of injection has been standardized for each operation. Barbotage is not practised and the rate of injection is kept uniform. For a given procedure, lumbar puncture needles of the same calibre are always used. Table I indicates the

TABLE I.

DOSAGE AND DILUTION OF PROCAINE IN SPINAL ANÆSTHESIA

Operation	*Injection between*	*Dose, mg.*	*Total physiological saline solution + spinal fluid, c.c.*
Perineal repair..	L_3 and L_4	80 to 120	2.5
Mayo vaginal hysterectomy..	L_2 and L_3	120 to 150	3.0
Herniorrhaphy..	L_2 and L_3	120 to 150	3.5
Appendectomy..	L_2 and L_3	120 to 150	4.0
Hysterectomy...	L_2 and L_3	150 to 200	4.5
Cholecystectomy	L_1 and L_2	150 to 200	5.0

Spinal needle, gauge 20-22; rate of injection, 0.5 c.c. per second.

dosage of procaine and the amount of liquid injected, the site and rate of injection, and the gauge of needle used for certain operations. For patients who constitute poor operative risks the dosage may be reduced 15 to 20 per cent without appreciably diminishing the duration of anæsthesia if injection is made one interspace higher than usual and if the dilution is decreased by 0.5 c.c. Two hundred milligrams of procaine are usually sufficient for operations on the gall bladder or stomach. Some pain, nausea, and vomiting may be induced, but rather than to increase the dose beyond safe limits it is preferable to administer nitrous oxide and oxygen or ethylene and oxygen.

COURSE OF ANÆSTHESIA

Following administration of the procaine the patient is turned on his back. A feeling of warmth followed by a feeling of numbness appears in the lower limbs. Motor paralysis develops, but with the smaller doses (120 mg.) loss of function may not become complete. The temperature of the surface of the feet increases to a maximum of 35°C. in the average case. Anæsthesia develops in three to seven minutes, and becomes stationary in ten minutes. During this period the extent cephalad of anæsthesia may be increased beyond the calculated level if the head of the table is lowered. After the drug has become fixed, the full Trendelenburg position may be employed if the surgeon desires it without further influencing the level of anæsthesia. All changes in position should be made slowly and gently to prevent nausea, vomiting, and respiratory embarrassment. When procaine is used, anæsthesia is maintained for from thirty to seventy minutes. For three to six hours after operation the patient is kept in the horizontal position and the head is not elevated. For patients who exhibit lowered blood pressure, the foot of the bed should be raised 6 to 10 inches.

ANÆSTHETIC AGENTS OTHER THAN PROCAINE

If one limits oneself to a maximal dose of 200 mg. of procaine, and in my opinion this should rarely be exceeded, the duration of anæsthesia for certain operations is frequently not sufficient. The nausea and vomiting sometimes encountered following the administration of procaine are distressing to the patient and may interfere with the work of the surgeon. Reduction in the systolic blood pressure may be accompanied by alarming symptoms. Occurrence of these difficulties has intensified the search for drugs which will not produce these untoward reactions. At The Mayo Clinic a number of newer drugs have been tested experimentally on animals and rejected as unsuitable for clinical use, either because they were too toxic or because they did not equal or surpass procaine in anæsthetic potency. Nupercain and pantocain have been used clinically.

Nupercain, the hydrochloride of α-butyloxycinchoninic acid diethylethylenediamide) is a quinoline derivative that is freely soluble in water, that is free from alkali. The drug was employed 327 times for production of spinal anæsthesia. It was found that when given in doses sufficient to produce uniformly satisfactory anæsthesia, its action was too prolonged, the incidence of pulmonary congestion was increased, and restoration of normal blood pressure was delayed and rendered difficult in the presence of surgical shock.

Pantocaine (butylaminobenzoic acid-β-dimethylamino-ethylester hydrochloride,) is a derivative of procaine. It differs from procaine chiefly by the attachment of a butyl group to the nitrogen of the aminobenzoic acid, and replacement of one diethyl group by one dimethyl group. The hydrochloride is a white crystalline substance, soluble in water and physiological solution of sodium chloride. A solution in a concentration of 1 per cent has a pH of 5.8 and a specific gravity of 1.006. Boiling does not reduce its efficiency, and sensitivity to alkali is not so marked as with nupercain. Füssganger and Schaumann[5] found that when injected intravenously in rabbits pantocaine is about nine times more toxic than procaine if 55 mg. per kilogram of body weight is considered the average lethal dose of procaine. The same authors found the drug three times more toxic than cocaine on the basis that 18 to 20 mg. per kilogram of body weight represents the lethal dose of cocaine. Wiedhopf[12] found pantocain two and a half to three times less toxic than nupercain when injected intravenously in dogs. Runge and Schmidt[9] found pantocaine to be six to seven and a half times as toxic as procaine on an absolute basis of milligrams per kilogram of body weight, but if effective concentrations, such as are used in practical anæsthesia were considered, pantocain was relatively slightly less toxic than procaine.

From February, 1931, to May 1, 1932, this drug has been used intradurally 628 times. Dosage is calculated on the basis of 1 mg. for each 20 pounds of body weight, with 5 mg. added. The maximal amount used for any operation is limited to 20 mg. A concentration of 1 per cent (10 mg. per c.c.) is employed, and, as with procaine, spinal fluid is used as diluent. The extent cephalad of anæsthesia is varied by varying the total amount of fluid injected. Details regarding the administration are outlined in Table II. For approximately 100 cases the dosage of pantocaine has been reduced by employing procaine in combination with it. It has been found by McCuskey,[7] and more recently by myself, that satisfactory anæsthesia can be obtained with 5 or 10 mg. of pantocaine, when combined with from 50 to 100 mg. of procaine (Table III.). The duration of anæsthesia is from one and a half to two times that obtained when a safe dose of procaine is employed for the same operation. If pantocaine alone, in an amount sufficient to produce anæsthesia to the desired extent cephalad, were substituted for the same operation, the anæsthetic effect would continue two to three times as long as when procaine was employed alone. For the majority of operations, a combination of pantocaine and procaine produces anæsthesia of satisfactory duration.

Pantocaine has not displaced procaine as the drug of choice. It has, however, displaced nupercain for operative procedures that are time-consuming. Because it fails to arrive at a fixed position in relation to the nerve roots to be attacked as rapidly as does procaine, and because it is exceedingly potent even when greatly diluted, employment of this comparatively new drug is reserved for operations below the umbilicus.

TABLE II.

USE OF PANTOCAIN IN SPINAL ANÆSTHESIA

Operation	*Injection between*	*Dose, mg.*	*Total physiological saline solution + spinal fluid, c.c.*
Mayo vaginal hysterectomy	L_2 and L_3	10 to 12	2.5
Fulguration within urinary bladder	L_2 and L_3	12 to 15	3.0
Transplantation of ureter	L_2 and L_3	12 to 15	3.5
Herniorrhaphy (bilateral)	L_2 and L_3	12 to 15	3.5
Complete abdominal hysterectomy	L_2 and L_3	15 to 20	4.0

Spinal needle gauge, 20-22; rate of injection, 0.5 c.c. per second.

TABLE III.

USE OF PANTOCAIN AND PROCAINE COMBINED IN SPINAL ANÆSTHESIA

Operation	*Injection between*	*Combined dose, mg.*		*Total physiological saline solution + spinal fluid, c.c.*
		Pantocain-	*Procaine*	
Mayo vaginal hysterectomy	L_2 and L_3	5	50	2.5
Fulguration within urinary bladder	L_2 and L_3	10	50	3.0
Transplantation, ureter	L_2 and L_3	10	50	3.5
Herniorrhaphy (bilateral)	L_2 and L_3	10	50	3.5
Hysterectomy, complete abdominal	L_2 and L_3	10	100	4.0

Spinal needle, gauge 20-22; rate of injection, 0.5 c.c. per second.

DESIRABLE AND UNDESIRABLE EFFECTS

Certain complications may occur during operation, and unfortunately knowledge of the physiological reaction involved is incomplete in many cases. Failure to obtain anæsthesia is regrettable, but is due usually to faulty technique rather than to anatomical anomalies. If anæsthesia is not effective twenty minutes following injection, a second injection may be made with comparative safety. Anæsthesia which does not extend as far cephalad as is desired is annoying and may necessitate administration of an anæsthetic by inhalation.

It is the reduction of blood pressure beyond anticipated limits which gives most concern. A fall in blood pressure of from 15 to 20 mm. of mercury in the first twenty minutes may be expected, but a continued drop creates a problem. It has been found clinically that inclination of the head downward is an essential factor in preventing excessive fall in blood pressure. This inclination may be increased to the full Trendelenburg position when it is necessary. If the depression of blood pressure continues beyond the limit anticipated in the average case the patient should be persuaded to breathe deeply. Administration of oxygen, 90 per cent, and carbon dioxide, 10 per cent, will increase the respiratory excursion; the blood flow to the heart is augmented and the blood pressure is raised. Epinephrine, 5 minims, may be given subcutaneously, and the dose repeated once or twice. If the drop in blood pressure occurs late in the operation, and is associated with surgical shock, intravenous administration of physiological solution of sodium chloride is frequently productive of

beneficial results. Epinephrine, 2 to 4 minims of a 1:1000 solution, may be injected with the first few cubic centimetres of the saline solution given.

With the decrease in blood pressure there may be pallor, nausea, retching and vomiting. Treatment of the drop in blood pressure ordinarily alleviated nausea of this type. Frequently the reaction is psychic and has no relation to blood pressure. Sufficient preliminary medication and an entertaining anæsthetist may eliminate this complication. Nausea may be due to a reflex stimulation initiated by insertion of intra-abdominal packs or by manipulation of the viscera, particularly of the upper part of the abdomen. The surgeon's cooperation is essential when these circumstances are present. In a percentage of cases the retching may be sufficiently annoying to the surgeon that supplementary anæsthesia with nitrous oxide and oxygen, or ethylene and oxygen, will be required.

Occasionally patients may complain of severe pain in the lower limbs, although anæsthesia and relaxation may extend to the costal margin. When this rather bizarre reaction occurs, supplementary anæsthesia with nitrous oxide and oxygen, or ethylene and oxygen, is indicated. One patient who complained of this pain also complained bitterly of pruritus. The area involved was a band two inches in width immediately cephalad to the level to which anæsthesia extended. This patient was not given a supplementary anæsthetic and his pain and pruritus persisted until the effects of the procaine disappeared. The post-operative course in any case in which these reactions have been exhibited has been uneventful.

Following operation, headache is the most common complication, but it does not occur more frequently following spinal anæsthesia than following lumbar puncture for diagnosis when from 6 to 7 c.c. of spinal fluid has been withdrawn. It has been reported that a retention enema of 180 c.c. (6 ounces) of 50 per cent solution of magnesium sulphate gives relief. Surgical pituitrin, 1 c.c., or ephedrine, 50 mg. (¾ grain), given hypodermically, produces improvement in some cases, but time is the essential factor influencing ultimate relief. Areas of numbness in the legs may persist for some time, but this numbness usually disappears without treatment. Foot-drop may develop occasionally, as it does following a general anæsthetic, and is likely due to pressure on a nerve trunk rather than to the anæsthetic agent or the method of administration.

In a series of more than 7,000 cases in which spinal anæsthesia was induced at The Mayo Clinic no permanent motor paralyses have been encountered. Ocular palsy, involving the lateral rectus muscles, is of rare occurrence. Strabismus may develop in the second week following operation, and the patient complains of double vision. Two cases have occurred in the series, and recovery without treatment took place. These complications occur rarely, but should be thought of as possibilities.

Properly induced spinal anæsthesia, using any of the approved methods, produces complete freedom from pain in the operative field, and absolute relaxation of the muscles. Operative exposure is facilitated. The dose of the drug is small, and is so placed that maximal anæsthesia is obtained with the least generalized toxicity. The maximal fall in blood pressure occurs early in the operation, when the patient is best able to withstand it. Mucous membranes are not irritated as with ether, and post-operative vomiting is minimal. The method may be used for patients requiring emergency surgical procedures but who have slight infection in the upper part of the respiratory tract. The incidence of post-operative pulmonary complications is not increased, and fluids can be administered earlier after operation than where general anæsthesia has been induced.

The method has its limitations. The patient is awake and may fail to cooperate. Faulty technique in administration is more obvious than with a general anæsthetic. Nausea and vomiting may necessitate the administration of supplementary general anæsthesia. With the use of procaine there is a definite limit to the duration of anæsthesia. For operations within the upper part of the abdomen, rather than increasing the dose of procaine, supplementary general anæsthesia is advised. For operative procedures below the level of the umbilicus that are time consuming pantocain, either alone or preferably combined with procaine (Table III), may be employed.

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Clinical Conferences

THE TREATMENT OF ANÆMIA*

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"In medicine we do not think that it is proper to have recourse to hypotheses, the unknown should be reached from the known. Great attention should be given to what happens by chance, if the phenomenon can be confirmed upon several occasions."

In these words of Hippocrates is probably the first appeal for a rational system of therapeutics based upon observation and experiment. Neglected through two thousand odd years of empiricism and methodism, of purgation and blood letting, they are being hearkened unto to-day in the laboratory and at the bed side, and what measure of success has been achieved in the treatment of disease depends largely upon the recognition of these principles. The recent development of methods for the successful treatment of anæmia may be attributed largely to what Hippocrates termed chance, amply confirmed by experiment.

There exist to-day certain broad general therapeutic principles which apply to the treatment of all types of anæmia, whether the anæmia is but a symptom of some other disease, as is so frequently the case, or whether it is a disease entity. In addition, there are certain drugs which are more or less specific for one or other types of anæmia. It is my aim to discuss briefly these broad general principles underlying the treatment of all types of anæmia, and then pass on to the story of how these so-called specific substances were developed and how they may be successfully used.

GENERAL MEASURES IN THE TREATMENT OF ANÆMIA

In the treatment of anæmia of whatever cause, fresh air and sunshine, physical rest and mental serenity are essentials. Massage and hydrotherapy are valuable adjuncts, but should be used in moderation. High altitudes sometimes prove of benefit through stimulation of the marrow, but may be dangerous if the anæmia is severe. After the anæmia has shown moderate improvement, exercise may be gradually assumed, but physical exertion to the point of fatigue must be avoided. The diet should be light, but nourishing. Frequent small meals serve to maintain a high calorific content without overloading the stomach. Osler's statement that milk differs from good rich blood only in colour is not supported in recent investigations. It falls far short of such foods as liver, beef-steak, apricots, peaches, prunes, raisins and other vegetables rich in iron.

Probably the most important point which makes for success in the treatment of anæmia is the diligent search for the underlying cause and, if possible, its removal. If the latter is possible the anæmia will usually take care of itself. Such an investigation should never fall short of a careful history, a thorough physical examination, a test meal, gastro-intestinal x-rays, and urine, stool and blood analyses.

Turning then to a consideration of the treatment of those specific diseases of undetermined etiology, which are characterized chiefly by a more or less severe grade of anæmia and its resulting symptomatology, it seems proper to mention first a disease due to aplasia of the blood-forming organs—aplastic anæmia.

CRYPTOGENETIC APLASTIC ANÆMIA OR ALEUKIA HÆMORRHAGICA

Cryptogenetic aplastic anæmia, or aleukia hæmorrhagica, is a rare disease. It is indistinguishable clinically from that type which is secondary to the exhibition of x-rays, radium, benzol, etc. The treatment is entirely symptomatic and at best can prolong life for about six months. Upham and Nelson reported improvement following the feeding of raw fetal liver in amounts from four hundred to one thousand grm. daily. Gibson published a case which improved after daily subcutaneous injection of five minims of a 1-1000 adrenalin solution. The efficacy of both of these therapeutic gestures must await the verdict of time. In two cases at the Montreal General Hospital recently, the effect of raw liver pulp, adrenalin, stomach extract, massive doses of Blaud's Mass, and Blaud's Mass with copper, was nil, as the patients died in the expected period of time.

* A clinical lecture in Advanced Therapeutics delivered at McGill University on December 6, 1932.

Another patient, seen with Dr. H. A. Lafleur, demanded that something radical be done. When his wishes or those of his friends were not complied with he was placed in another hospital, where the spleen was removed. However, in spite of this heroic treatment, the disease continued its unremitting downhill course to the inevitable fatal termination. Transfusions unquestionably prolong life a little, but in many cases they are of doubtful value, and this is especially true if there is no evidence of bone-marrow activity upon examination of the circulating blood.

PERNICIOUS ANÆMIA

The successful treatment of pernicious anæmia to-day is an eloquent tribute to painstaking and enlightened observations in the realm of pure research, coupled with the genius of the clinical mind to grasp their significance and to apply them to a practical use. These modern methods have resulted from the exhaustive investigations of Whipple and his co-workers at Rochester. About ten years ago they began an investigation which was destined to change completely the hopeless outlook of the victim of pernicious anæmia, although at the time they did not know it. The original research dealt with the effect of literally hundreds of foodstuffs upon blood regeneration in experimentally induced anæmia in dogs. The outcome of this investigation, namely, that liver, kidney and chicken gizzard excelled by far all other substances in this respect, was made use of by two clinicians, Minot and Murphy, in cases of human pernicious anæmia. Minot found that adequate amounts of liver were capable of inducing a prompt remission of this disease, which persisted as long as the liver was taken by the patient. Within five to seven days of the beginning of a daily diet containing half a pound of liver, either raw or cooked, the patients began to show evidence of a rapid regeneration of the blood, namely, an increase in the reticulocytes or young erythrocytes. Within ten days a quantitative increase in the blood was noticeable. In from six weeks to two months the patients' blood was restored to the normal values.

One of the most difficult practical problems in this connection is the preparation of the liver. There is no doubt that fried liver is effective, but it is not so effective as raw liver; patients tire of it, and sooner or later give it up in spite of the doctor's protests. Raw liver pulp is, in our experience, tolerated for a longer time by the patient, and does not suffer diminution of potency through heating. A method of preparing palatable raw liver pulp is as follows: a half pound of liver, either beef, pork, or calf, is ground up finely and sufficient water is added to give it the consistency of heavy cream. This mixture is thoroughly beaten up with an egg-beater and squeezed through cheese-cloth to remove all fibre. The filtrate, about six ounces in amount, is chilled and flavoured to suit the palate of the individual patient. This is unquestionably the safest, cheapest and easiest way to take liver. Its disadvantage lies in the tediousness of preparation, but it is the ideal method of treatment for clinic patients who cannot afford expensive extracts, as the cost is minimal and nourishment as well as specific extract is supplied.

The next step, the work of Cohen in Minot's laboratory, was the isolation of the active anti-anæmic principle from liver, by a process of fractional alcoholic precipitation and extraction, which has now been purified and concentrated to such an extent that it may be given intramuscularly or even intravenously. At the present time there are commercial extracts of such potency that a single intramuscular injection of 5 c.c. is capable of bringing about a remission of the disease.

The interval of time which elapses between the beginning of therapy and the reticulocyte response, or remission, is the same, whether the liver or extract administered orally is given in a single large dose or in smaller doses thrice daily. The response begins usually about the 7th day, and reaches its maximum on the 13th or 14th day. One of the great advantages of the intramuscular or intravenous administration of extract is the rapidity with which it acts. The reticulocyte response begins often within 24 hours and reaches its maximum about the seventh day. Thus a week is gained and this is an important factor especially for patients who have a grave anæmia, or who may be *in extremis*.

The exact nature of this extract of liver is not known. It is non-protein in nature, free from carbohydrate, lipoids or iron, and is not

one of the known vitamines. The effective substance is thought to be a polypeptide or nitrogenous base. Dakin, West and Howe believe it to be a compound of beta-hydroxy-glutamic acid and hydroxyproline.

During the period when liver extracts were being purified, Castle, also at Harvard, was studying the etiology of the disease. He began by incubating normal gastric juice with Hamburg steak, and feeding this mixture to patients with pernicious anæmia. The effect on the patients was found to be identical with that of liver in producing a reticulocytosis indicative of a remission of the disease. But when he repeated the experiment, using gastric juice obtained from a patient suffering from the disease, no reticulocytosis resulted. These experiments indicated a deficiency in the gastric juice of the latter which lead Sturgis and Isaacs, at Ann Arbour, to desiccate defatted hog's stomach and try it on patients with pernicious anæmia. The remission was identical with that following liver and liver extract.

Additional proof of the important rôle played by normal gastric juice in preventing anæmia, has been submitted by Morris and his co-workers who have produced a prolonged reticulocytosis and a consequent remission of pernicious anæmia by a single parenteral injection of concentrated hog's gastric juice. The active intrinsic factor, essential in bringing about a remission in the disease, would appear to be present in normal liver and stomach, and is effective whether administered by mouth or intramuscularly.

In maintaining a remission we are concerned chiefly with two factors, (a) the maintenance of the normal blood level, and (b) the prevention or cure of existing spinal cord degeneration. Unfortunately, there is no general rule that will apply to all cases. Either as a result of individual disposition, or the virulence of the disease, or of both, each case must be a law unto itself. It is our practice to give enough of the active principle, whether in the form of liver, liver extract, or stomach extract, to maintain the blood at or above the normal level and as much more as the patient's circumstances in life allow. A considerable amount of liver or extract over and above that necessary to maintain a normal blood level is often required to prevent or control the subacute combined degeneration. We do not know why the cord lesions can be arrested or improved in one instance, and why they progress in another. As a general rule the tabetic type responds much better than the spastic cases, which commonly tend to progress. Isaacs has pointed out that cases under treatment frequently have an increase in their cord signs and symptoms at intervals which probably correspond with natural exacerbations of the disease. At the first suggestion of such an event the amount of active principle must be doubled. If the patient is taking 500 grm. of liver or its equivalent in extract, or 10 grm. of desiccated hog's stomach daily, at the time these symptoms make their appearance these amounts must be doubled until all symptoms disappear. It goes without saying that some treatment must be continued indefinitely.

Hydrochloric acid has long been used in treating the gastrointestinal symptoms, and continues to be a valuable drug, although the frequency of these symptoms is much less since the introduction of specific therapy. Diet is apparently inconsequential. Physiotherapy in its various forms deserves mention. When used in conjunction with specific therapy in the treatment of the cord lesions it is admittedly a valuable adjunct to our therapeutic armamentarium.

What then are the ultimate results to be expected from the modern treatment of the disease? It is impossible during such a short period of specific therapy to give any accurate indication of its ultimate success. There are many patients who cannot, or will not, take sufficient liver extract, and it is hardly fair to judge the results of treatment by these. Such cases inevitably show advancing cord degeneration, and once the damage has been done destitution to integrity is well-nigh impossible. As has been pointed out already, greater results may be expected from the tabetic than from the spastic cases. As an illustration, let me cite the case of a young engineer of thirty-nine years who was seen with Dr. F. S. Patch in May, 1930. Because of a flaccid condition of the lower extremities a diagnosis of tabes had been made by his family doctor. The actual paresis was obviously not due to tabes but to pernicious anæmia. He was removed to his home in a wheel-chair, with instructions to take a half pound of liver pulp daily, which he did without missing a day over a period of two years.

In October he reported that he had discarded his crutches, could play a little golf, and was walking about with the aid of a cane and ankle supports. In January, 1931, he had discarded his cane and ankle supports, and in the following June was playing eighteen holes of golf five or six days a week, and was walking two miles to work three times a day.

This is unquestionably an unusual case, but it serves to illustrate that improvement in the cord degeneration does follow proper treatment, especially if the patient be young. If over sixty and signs of senility, such as generalized arteriosclerosis, are present, little improvement may be expected.

IDIOPATHIC HYPOCHROMIC ANÆMIA

Turning then from pernicious anæmia, let us consider a disease which rates with it in economic importance, though not in morbidity. It maims but it does not kill. I refer to idiopathic hypochromic anæmia, simple achlorhydric anæmia, or, if you will, chronic chlorosis. Its nomenclature cannot be discussed at the present time. *En passant,* let me remind you that it is a disease which affects women before the menopause, which is characterized clinically by the presence of a moderately severe low colour-index, and usually by a curious dystrophy of the finger nails, an enlarged spleen, and achlorhydria gastrica. It is further noted for its great chronicity and for its resistance to ordinary methods of treatment.

The literature, prior to the year 1928, contained scant if any reference to the disease, because it was not until the discovery that it is absolutely unaffected by the most lavish liver therapy that clinicians were willing to admit of its identity as a disease separate and distinct from pernicious anæmia, with which it has many features in common. Prior to the discovery of liver therapy for Addisonian anæmia, the failure of known therapeutic methods in these so-called atypical cases was not startling to the clinical mind, but after it, attention was at once focussed upon them.

The disease rapidly received recognition in this country, in England and in Germany, and articles on the subject began to appear in the literature of these countries almost simultaneously. As it was found to be uninfluenced by liver or liver extracts, and was primarily a hæmoglobin deficiency disease, in this respect closely resembling chlorosis, the therapeutic effect of iron was tried, but without much success. It may be recalled at this point that the accepted therapeutic dosage of iron a decade ago was the equivalent of one or perhaps two Blaud's pills thrice daily, and since a Blaud's pill contains about a half grain of iron in the ferrous state, the dosage of iron was not a heroic one. But Blaud's pills by ones and twos and even threes were soon found to be powerless to restore the hæmoglobin level, though they had rendered such yeoman service in the bygone days of the green sickness.

Not to be defeated, enterprising students of the disease, like Witts, of London, Kaznelson, in Germany, and Minot, in Boston, were trying more heroic amounts of iron. In Germany some success was achieved through the use of ferrum redactum in daily doses of from three to six grams, or 45 to 90 grains. In this country and in England, ferrous or ferric salts in daily doses of 60 to 90 grains were tried with incomplete results, achieved only after two to three months of this intensive treatment. Very much like the shipwrecked sailor, dying of thirst with water all around him, but unable to make use of a single drop, these patients are literally surrounded by iron, need it badly, but cannot properly assimilate it and build it into a hæmoglobin molecule. However, again the laboratory came to the rescue. In Michigan, Hart, Steenbock and his co-workers were studying the effect of various metals upon the anæmia which occurs in certain animals such as rats, when fed upon a diet of milk. They were eventually able to show that the hæmoglobin in rats suffering from a milk anæmia is not built up by inorganic iron alone but only when certain accessory factors are present. The same amounts of iron were given, whether in the form of inorganic metal or green vegetables, but the hæmoglobin improved on the vegetables and did not on the iron chloride alone. The next step was the conversion of the organic iron of the vegetable into the chloride by the addition of hydrochloric acid. Now the vegetable iron was given in the same form and amount as the solution of ferric chloride. Again the iron derived from the vegetables was effective, while the solution was inert. What could be the difference? Obviously any accessory factor

must be inorganic, as the vegetable was ashed and treated with hydrochloric acid. Analyses showed minute amounts of copper. The final step was to add a copper salt to the inert ferric chloride solution and demonstrate its effectiveness in curing the anæmia. These experiments led to the addition of copper to the ferrous carbonate in the treatment of idiopathic hypochromic anæmia.

The clinical use of iron and copper.—During the summer of 1929 the effect of massive doses of Blaud's mass upon a group of these cases was being investigated without much therapeutic success. After a month's trial on 60 to 75 grains of Blaud's mass in the form of capsules the patients experienced little subjective improvement, and the hæmoglobin level in no case showed striking improvement. Frequently there was none at all. At this point it was determined to add copper sulphate to the Blaud's mass, as these cases appeared suitable for testing clinically the observations of Hart, Steenbock and their co-workers upon anæmia in rats. A survey of the literature at that time revealed no reports of the clinical use of iron and copper in the treatment of human anæmia. After several trials in which larger amounts of copper were used, with gastrointestinal symptoms in all cases, 1/48 gr. of copper sulphate added to 30 grains of Blaud's mass was selected as a suitable combination. This amount of drug was given in the form of a gelatin-coated capsule three times a day, so the patients received about 90 grains of Blaud's and 1/16 of a grain of copper sulphate daily. The results were most gratifying. Improvement in the hæmoglobin level began within a week of the beginning of treatment and continued until normal. We have only encountered three failures with this form of treatment in treating over 40 cases, though relapse is common if the treatment is stopped indefinitely. These results have been duplicated by Adamson, of Winnipeg.

It is our practice to give these capsules till the blood has been restored to its normal values, and then to give only sufficient to maintain it at the normal level. This may require a month's treatment once a year. Hydrochloric acid therapy seems to have no effect on many of these cases, though all lack normal gastric acidity.

Just why copper aids the metabolism of iron is a problem which awaits solution. Many other metals, such as germanium and manganese, have been tried in conjunction with iron, but none give results comparable to copper. It has been suggested that the copper acts as a catalyst, as certain salts of copper are known to be good catalysts *in vitro,* but this is by no means proved. The fact remains that huge doses of iron—many hundred times the amount actually required by the hæmoglobin-deficient individual—are passing through their intestinal tract but are often not made use of. The addition of copper renders some of this huge excess of iron available to the hæmoglobin-deficient individual, with prompt and satisfactory clinical results.

In conclusion a word of caution may be added. Iron and copper are not a panacea for all types of hypochromic anæmia, and too often the patient receives this treatment when he really needs an ulcer regime, a gastric resection, or some thyroid extract. Then, again, there is the danger that the case may really be one of Addisonian anæmia. Too great pains cannot be taken in establishing the diagnosis before liver therapy is begun. *If you can exclude an etiological factor* and remember that the anæmic woman under forty-five nearly always suffers from hypochromic anæmia, and the anæmic man over forty-five from pernicious anæmia, you will not often be wrong.

I hope I shall not need any motives to encourage the green Herbarist to this study (botany). If Pleasures may invite him, what fairer objects are there for the sight then these painted Braveries? What Odours can ravish the sense of smelling more than those of flowers? If the sensuality of the Taste hath delighted him, what can be more acceptable then the luxurious deliciousness of Fruits: An for that high concernment we all seek after, Health, what hath the great preserver of all things rendered more soveraigne then the vertues of Herbs and Plants, without the use of some of which no Confection can be made by the Apothecary.—Wm. Coles, in "Adam in Eden, or Nature's Paradise," 1657.

Case Reports

A STAPHYLOCOCCUS INFECTION PRODUCING AN INFLAMMATORY MASS SIMULATING A SPINAL CORD TUMOUR

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J. K., aged 25, Polish, a carpenter, first attended the Medical Out-patient Department of the Toronto General Hospital in September, 1931. He was seen by Dr. Trevor Owen, who made a provisional diagnosis of "Transverse lesion of the lumbar cord and luetic choroido-retinitis." A blood Wassermann test had been reported: "Please repeat". The patient was advised to enter hospital for further investigation and treatment. He was admitted to the Medical Service on September 21st, where the following history was obtained with difficulty, owing to his poor command of English.

History.—The patient had been perfectly well up to five weeks before admission. At that time he began to have difficulty in walking due to weakness and unsteadiness in his legs. One week later he was seized with crampy pain in the upper half of his abdomen. This was present constantly for three weeks and, although never very severe, had prevented sleep on occasions. During the week prior to admission there had been very little pain, but the legs had become much weaker.

He had always been well with the exception of a period of three months, nine years before the onset of his present illness, when he was in hospital in Poland with exactly similar abdominal pain and weakness in the legs, the latter so severe that he was unable to walk for ten weeks. He stated that several samples of his blood were taken and he was told it was "no good". He was given six or seven injections into his arm, but has received none since. The pain subsided and the legs entirely recovered. He denied ever having had any symptoms of venereal infection.

Physical examination. — The patient was a well-nourished young man of excellent physique. No abnormalities were detected in the cranial nerves. Accumulations of black pigment were seen in the periphery of both retinæ. These were deposited in an irregular fashion, most prevalent on the temporal halves of both fundi. In the vicinity of the pigment were pale areas denoting retinal atrophy. Neither macula was involved. The margins of both discs were slightly blurred. No vitreous opacities were present and no gross abnormality of the blood vessels. Vision was 6/6 with both eyes. The upper limbs showed nothing abnormal. No weakness was detected in the muscles of the trunk or abdomen. His gait was slow and of the spastic-ataxia type. Romberg's test was positive. There was no vibration sense below the level of the trochanters, and the sense of position was lost in both great toes. The legs were spastic, with increased knee-jerks, bilateral ankle-clonus, and bilateral extensor response to plantar stimulation. A band of cutaneous hyperæsthesia extended across the abdomen in the area of the 10th and 11th thoracic segments. Below this level sensation of light touch, heat and cold, and pain gradually diminished. Pin-pricks were barely felt over both feet. There was no disturbance of the bladder or rectal sphincters.

An x-ray of the dorsolumbar spine showed no evidence of pathological bone change. The blood Wassermann test was negative (repeated twice with same result). The white blood count was 10,000 (polymorphonuclears, 76 per cent), and the urine examination negative. The temperature was normal during nine days on the medical ward. Spinal puncture, with the Ayer manometer, showed a 2 cm. slow rise and fall on compressing and releasing the jugular veins. The fluid was clear; cell count 5, all mononuclears; Pandy test and Ross-Jones test, plus two; total protein, 200 plus mgrm. per 100 c.c. The spinal fluid Wassermann and colloidal gold tests were negative.

In view of the history of a previous attack nine years before, it was thought that the subarachnoid block might be due to arachnoidal adhesions secondary to an inflammatory condition. A double puncture and cisternal lipoidol

injection were performed in order to investigate the nature of the block. Jugular compression caused a quick rise in the cisternal and practically no rise in the lumbar pressure. The fluid removed from the cisterna magna was normal. X-ray of the spine, following the injection of 1.5 c.c. of lipiodol, showed most of the lipiodol arrested at the level of the ninth and tenth thoracic vertebræ. It presented a streaky appearance, indicating an irregular type of block. The level of the lipiodol arrest corresponded with the sensory level and the condition was regarded as a spinal cord tumour, the cord being compressed at the eleventh and twelfth thoracic segments.

The most puzzling features of the case were the history of a similar attack nine years previously with complete recovery and the presence of the choroidoretinitis. The absence of any history of venereal infection, the repeatedly negative Wassermann tests, and the character of the cerebrospinal fluid, were regarded as being strong evidence against a syphilitic origin for the symptoms. A consultation with Dr. K. G. McKenzie was requested. He agreed with the diagnosis, suggesting that the tumour was extradural.

Operation.—(by K. G. McK.) October 2, 1931. The laminæ of the seventh to the tenth thoracic vertebræ were removed. The extra-dural tissue was unusually dense and thick. There was no evidence of disease of the adjacent bone. The dura, but not the arachnoid, was opened in the upper portion of the wound, exposing a normal-appearing spinal cord with a good pulsation in the surrounding sub-arachnoid space. At this stage of the operation an irregular mass of tissue was noticed beneath the laminæ of the eleventh thoracic vertebra. The dura above was carefully closed and this tissue exposed by removal of the laminæ of the eleventh and twelfth thoracic vertebræ. An uneven dense mass of extra-dural tissue, 7 cm. in length and extending laterally to the dorso-lateral aspect of the dura, lay exposed. In its lower third, where the surface had a necrotic appearance, it was 1 cm. in thickness, and two swabs taken from this area at a ten-minute interval were subsequently found to grow *staph. aureus* on culture. The whole mass was so readily stripped from the surface of the underlying dura that it was our impression the dura itself was not invaded by the inflammatory process.

Microscopically, sections showed a dense fibrous tissue with scattered focal areas of lymphocytic and plasma-cell infiltration. The areas of apparent necrosis showed a granulation type of tissue containing numerous injected vessels, diffusely infiltrated with polymorphonuclear leukocytes. Serial sections showed that this reaction was practically limited to the dorsal third of the mass, with a few narrow, finger-like projections toward the surface adjacent to the dura.

Progress.—The patient was extremely restless and complained of severe pain in his back during the first few days after operation. On the fifth day the wound was re-opened and a large blood clot evacuated. Culture taken from the depths of the wound at this time grew staphylococcus aureus. The wound was re-sutured and drainage was provided. His temperature gradually mounted to 104° four days later, and on the following day the wound was again re-opened and a fairly large quantity of pus evacuated. Healing from this stage was slow but uneventful.

At the time of the patient's discharge, two months after operation, the wound was completely healed. He said that his legs felt stronger, and he walked considerably better than on admission. The reflexes and sensory changes, however, were practically unchanged. The sub-arachnoid block had been relieved, as x-rays now showed all the lipiodol to be in the cul-de-sac, and jugular compression caused a rapid and marked rise of the cerebrospinal fluid in a manometer attached to a lumbar puncture needle. Four months after discharge he was re-examined and, although he now felt perfectly well and strong, the neurological findings remained unchanged.

DISCUSSION

Reports of this type of case have been variously grouped with cases of acute extra-dural spinal abscesses, cases secondary to adjacent tuberculous or pyogenic bone infection, and cases with chronic syphilitic changes in the extra-dural tissue. Their classification is further confused by the number of titles under which they have been reported, such as pachymeningitis externa, circumscribed suppurative peri-

pachymeningitis, spinal epidural granuloma, and infectious granuloma of the dura. There are only about ten cases reported where the extra-dural chronic lesion was due to a pyogenic infection.

In 312 cases of spinal cord tumour at the Mayo Clinic, including 67 extra-dural tumours,[1] there was no example of the type of lesion reported here[2] — an evidence of their rarity. Ryerson[3] reported a case in 1922, which was similar in neurological and operative findings to our case, but with a history of acute onset eight months prior to operation. In 1926, Dandy[4] collected seven additional cases of inflammatory extra-dural tumour from the literature, four of which were of syphilitic or tuberculous origin. He had three cases of his own—one probably tuberculous in nature, the other two apparently due to direct extension from mid-dorsal carbuncles. Watts and Mixter[5] have reported four cases of chronic localized epidural infections of metastatic or unknown origin. They mention fever and increased lymphocytic count in the spinal fluid as important points in the differential diagnosis of these cases from spinal cord tumours; neither of these signs appeared in the case reported above.

The most unique feature of our case is the complete remission of the disease for nine years, during which time the staphylococci remained latent in the epidural tissues. All of the cases which we have encountered in the literature have had continuous symptoms, usually of three to eight months' duration. Alajouanine and Petit-Dutaillis[6] have reported a case of a soldier with flaccid paraplegia resulting from an infected bullet-wound of the spine, who made a gradual, though not complete, recovery after removal of the bullet, but sixteen years later developed severe spastic paraplegia. Laminectomy disclosed an encysted extra-dural abscess containing sterile pus.

The posterior column and pyramidal tract signs in our case, which persisted up to the time of discharge, are probably due to areas of degeneration in the cord underlying the lesion. Hassin[7] has reported a fatal case in which post-mortem examination revealed scattered areas of degeneration in the white columns of the cord and peri-neuritis of the adjacent roots. The absence of evident bone change in the x-ray picture, and of any overlying scar in the skin, suggests that the lesion in our patient was metastatic in origin. As he had a negative Wassermann and denied any former illness, except that of nine years ago, the choroidal retinitis found on examination might indicate that the first attack was an acute infection, possibly a septicæmia. That the epidural tissue, and not the underlying dura, was primarily involved was evident from a study of the serial sections, which showed the leucocytic infiltration to be practically limited to the dorsal third, with only a few fine projections down to the dura.

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GLIOMA OF THE CERVICAL CORD

BY IRENE ALLEN, M.D., C.M.,

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A girl, five years of age, entered the Saint John Tuberculosis Hospital with a tentative diagnosis of cervical Pott's disease.

Symptoms.—Stiff and painful neck.

Family history.—The father has a tuberculous knee-joint; the mother, living and well; one brother and sister, living and well.

Past history.—Measles with delayed recovery. When three years of age, she had whooping-cough, with a long convalescence. She had had tonsillectomy two weeks before admission to the hospital.

Present illness.—One year ago, the patient's mother noticed a persistent lifting of the chin, and turning of the head, to the left. At first this came on more or less spasmodically, lasting a short time, then disappearing. Within a month the position of the head became permanent, and was associated with considerable pain in the back of the neck and forehead. The child gradually became less active and more fretful. There was a gradual loss of weight, rotation of the head was increasing, and finally the child preferred staying in bed, presumably because of muscle weakness. She was afebrile,

and just before admission began to complain of considerable pain in her lumbar region.

Examination.—A rather thin child, lying in a curled-up position, with marked elevation of the chin; rotation of the head to the left. It was very painful for the child to move the head. On lying down there was distinct opisthotonus; marked spasm of the left sterno-cleido-mastoid muscle. No abnormality of the structure of the head.

Eyes.—Rotary nystagmus, quite jerky. The eye grounds were difficult to visualize, because of the constant movement of the eyes, but when seen, were normal. *Hearing* was definitely impaired, although the ear drums were clear. *Nose.*—Good breathing space. *Teeth.*—None were carious. *Tongue.*—Definite deviation to the right, when projected. No impairment of speech.

The lungs were clear; heart normal; pulse rate, 100; blood pressure 105/60. The abdomen was slightly scaphoid. The liver and spleen, normal in size, and no free fluid. The upper lumbar spine was more prominent, and there was considerable localized tenderness. No enlargement of cervical, axillary or abdominal glands. The child was unable to walk, and simply crumpled up when placed on floor. She rotated the body to the left, when helped.

Laboratory examination.—Urine, straw colour, clear, acid. A few pus cells in centrifuged specimen. Hæmoglobin, 70 per cent; red blood count, 3,110,000; white blood count, 10,000; Differential count: polymorphonuclears 62 per cent; monocytes 12 per cent; large lymphocytes 16 per cent; small lymphocytes 10 per cent. The Wassermann and Kahn tests were negative. Tuberculin tests were all negative. X-ray examination of the skull was negative.

Progress.—September 29, 1930.—She cried during night; restless; frontal headache. October 6.—Nauseated. October 8.—Crying spells. October 11.—Drowsy, headache; she eats well when fed but makes no attempt to feed herself. October 14.—Still drowsy; an involuntary stool. October 15.—She slept most of the day, fretful; two involuntary stools; pain in the back. October 17.—The left arm was paralysed. This paralysis came on gradually for ten days. Reflexes were hyperactive for one day, with stiff movement and finally a flaccid paralysis, with diminishing reflexes. October 18.—The child was brighter and ate enormous meals; frontal headache. October 20.—Recovery of paralysis in the left arm. October 21.—The left arm was again paralysed; incontinence of urine; child fretful.

The temperature range during this time was 98 to 100°; pulse 84 to 112. She was sent to Dr. Penfield, Royal Victoria Hospital, Montreal, with a tentative diagnosis of cord tumour.

OPERATION

November 11th, laminectomy and decompression of the spinal cord was done by Dr. H. V. Cone. At the level of the 2nd cervical segment there was a tumour projecting from the spinal cord on the left side. Below this there was a large cyst in the arachnoid of the spinal cord on the left side, which pushed the cord to the side. The vessels of the pia were numerous and fine. The cord was firm from the 5th cervical segment to the 1st. At no point, however, except at the level of the 2nd was there obvious tumour. The tumour was tough but was infiltrating the cord diffusely. A tiny piece was removed for microscopic examination.

The lamina of the upper five cervical vertebræ were removed in the usual way. The dura did not pulsate. When the dura was opened the arachnoid was adherent to it, but could be dissected from it. The cyst in the arachnoid was incised and the cord returned to the midline; then pulsation was evident. Because it was felt that the tumour could not be excised at the 2nd cervical segment without too much trauma of the cord, only a small piece was removed for section. It was felt that the chief difficulty was due to the pressure on the cord by the cyst in the arachnoid which had opened and drained.

The dura was left open. The wound closed in layers in the usual way.

Diagnosis.—Intramedullary tumour of the spinal cord presenting at the 2nd cervical segment; cyst in the arachnoid.

Subsequent history.—February 1, 1930. She has been home for some time. Paralysis and other symptoms markedly improved, but she still has a spastic gait. The head is quite straight. Two weeks ago she began to lose appetite, would not eat, and vomited frequently. Her mother noticed more than ever her deviation of one eye. Examination shows fair movement of head; chin still thrust forward; and slight opistho-

tonus. External rectus on the left side inactive. Right, normal. Tongue, deviation to the right. Left arm again is becoming paralysed. Reflexes were hyperactive. The child is becoming emaciated and irritable. March 7, 1931. The same symptoms as above. The left arm is partially paralysed; paralysis increasing day by day; losing power to grasp with right arm; gait more spastic. Two weeks later the child died. We were unable to secure an autopsy.

THREE CASES OF PATELLAR BURSITIS TREATED BY INJECTION OF TINCTURE METAPHEN WITH APPARENT CURE

BY J. C. DIAMOND, M.D.,

Fort William

CASE 1

A male, J. M., aged 42, gave a history of having had what his physician called a "housemaid's knee" for eight years, but it did not bother him very much until two days before consulting me. He knocked his knee against a wheel-barrow and the knee became swollen and quite painful, so that he had to quit work.

Examination revealed a swollen patellar bursa, very tense and tender. Rest and ice were prescribed for two days; the swelling seemed a little better, but the knee was still quite painful. Under strict asepsis I aspirated the bursa and obtained 40 c.c. of bloody serum. Then I injected through the same needle 5 c.c. of Tincture Metaphen, 1:200. I manipulated the bursa so as to get the liquid in contact with the whole lining of the sac, and withdrew as much of the fluid as I could obtain. I then strapped the bursa with a small pad of gauze, maintaining pressure for twenty-four hours. Upon removal of this dressing the bursa felt like a solid swelling, no fluctuation being detected on palpation. Cold compresses were being applied for two days longer, with rest in bed. The swelling disappeared and two weeks later no bursa could be detected upon examination. Complete occlusion of the bursal sac seemed to have occurred. One year and eight months has elapsed since the treatment, and there is no sign of recurrence.

CASE 2

A female, E. M., aged 21, had noticed a slight swelling over her right knee for several months previous to consulting me, but this did not seem to bother her very much. On the day of consultation she had washed the floors in several rooms of her house, when she noticed her knee began to swell and became very painful. Examination revealed a swollen patellar bursa, the size of a Japanese orange, very tender and tense. Her temperature was 101°, by mouth, and the pulse 90 per minute. Rest in bed and ice to the knee were prescribed. Four days after the temperature and pulse were normal, but the bursa was still tender and quite tense. A small wheal with 1 per cent novocain was made at the base of the bursa, and then a larger bore needle was introduced into the bursa and 24 c.c. of synovial fluid were withdrawn. No pus or blood was obtained. The bursal sac seemed empty when I removed the syringe to introduce the tincture, when I noticed the cavity had refilled with fluid. I aspirated again and withdrew 10 c.c. of venous blood. Maintaining pressure with the palm of my left hand on the bursa I quickly introduced 5 c.c. of the tincture, and, again manipulating the wall of the bursa, to bring the tincture in contact with the entire lining of the sac, I then withdraw as much of the fluid as I could obtain by aspiration. The knee was strapped in the same manner as in the first case. After two days the patient went back to work and has not had any further trouble. Examination reveals no apparent bursa, eleven months after the treatment.

CASE 3

A female, aged 52, had her patellar bursa aspirated on several previous occasions and solutions injected, but recurrence always took place. Her physician then advised excision. She consulted me eight months ago. Examination revealed a thickened bursa wall, and apparently sacculation through adhesions, and these saccules showed fluctuation. I aspirated four different compartments and injected from 1 to 3 c.c. in each saccule successively of the tincture, and withdrew in each case as much of the fluid obtainable, and a dressing was applied as in the previous cases. The patient

seems quite free from any swelling and apparently no bursal sac can be detected.

REMARKS

The number is too small and the time elapsed since the treatment is too short to draw any definite conclusions, but the treatment seems worth a thorough trial. Perhaps it may replace the more radical-method excision with success, at least in a fair number of cases. This method, however, must be used with caution, as one must be sure that the bursa does not communicate with the knee joint; such fluid introduced into the joint would be sure to cause damage. Also, should the bursa contain numerous adhesions from previous treatments the procedure becomes very tedious, and often unsuccessful results would occur. In such cases the best result is obtained through excision.

A CASE OF DEMENTIA PRÆCOX TREATED BY INTRASPINAL INJECTIONS OF HORSE SERUM

BY NORMAN VINER, M.D.

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Miss B.F., 22 years old, stenographer, born in Russia; in Canada 13 years. She had a public school education and two years at the Commercial High School. At onset, in September, 1927, when 19 years of age, she was a rather refined, wistful-looking girl, with an air of shyness and diffidence, tolerably well adjusted, but beginning to complain of peculiar ideas and emotional disturbances which she found very difficult to describe. There was already a suggestion of inhibition. A request for further interviews was not acted on. When seen again, late in November, inhibition was already well marked. "There is something I want to tell, but I can't." "Why?" A strained look—"I want to, but I can't; I don't know."

In the interval she had talked a good deal of a girl, a co-worker in the office, who acted as her mentor and had told her a lot about the ways boys kiss. She began to feel that this girl could read her thoughts or communicate her own to the patient across the room, and finally from the office to the patient at home. She got other messages from this girl, at a distance, that disturbed her, but she could not explain how, or what these messages were. She began to show increasing resentment, based on an old grievance that she had not been sent to college, and referred fearfully at times to the fact (never definitely established) that a year or two before a young man had tried to lure her away. By now pictures began to appear on the wall, some of them ugly and sneering. These pictures represented first shyness, secondly distress, thirdly envy. The other girl (from a distance) would tell her to knock on the wall to hit them. She felt that all this was strange and that her parents thought this very strange. There were a lot of other things to tell the examiner—but here her inhibitions were too strong for her.

At about the end of November, 1927, she was sleeping very little, spending most of the night pounding at the party wall—to strike at those images?—and began to have hallucinations of hearing as well, and also expressed resentment at being watched. She now stopped eating, and began to show violence to her mother and nurses, when hindered in any way. Her favourite occupation was to gaze raptly into space, apparently seeing and hearing things, and smiling to herself. Within a day or two she began to adopt katatonic attitudes and even dribble at the mouth. Schizophrenia was obvious and on December 4th the patient was admitted into the Verdun Protestant (Mental) Hospital. Here, though the sensorium was found to be fairly clear, the mental capacity fair, with a reasonable amount of insight, and the memory merely clouded by the patient's absorption in herself, nevertheless there was no question of the underlying condition. During 1928 the hospital records show variations and alternations of understanding, of mood and of behaviour, but always with a marked substratum of dementia. There were periods when she would feed herself, be submissive, and even show a little insight and responsiveness, alternating with hysterical spells, only to yield in turn to confusion, inhibition, apathy and self-neglect. Most of the time, however, she would show a passive negativism, which occasionally gave place to active resistance to being fed, kept clean or dressed, culminating occasionally in a mild degree of violence against relatives, nurses or other patients, and several times tube-feeding had to be instituted.

Early in 1929, as she was in a frankly "bench-type" katatonic state, immobile, speechless,

slobbering, unclean, cyanosed, œdematous and pimply, and realizing that routine measures had been of no avail, the manganese chloride treatment was resorted to. She was given 30 intravenous injections of this drug, with the usual reactions. Physically there may have been some improvement, but psychically the most optimistic onlooker could detect no amelioration of the patient's mental content, sensorium, emotional reactions, or general behaviour. She was as shut-in as she had ever been. Recourse was then had to other measures. At first it was contemplated to try to recall her by the carbon dioxide inhalation method, but on the further consideration that it, at best, would yield but a few minutes of mental clearing this plan was discarded, and Carroll's[1] method was resorted to. To quote Hinsie[2];—"Acting on the probability that in schizophrenia the choroid plexus might be involved to the extent of interference 'with normal chemiotaxis and that, perchance, dementia præcox might prove to be a food-chemico-deprivation rather than a toxic destructive process', Carroll introduced inactivated horse serum into the sub-arachnoid space through a lumbar puncture. Twenty-five c.c. of cerebro-spinal fluid were withdrawn and an equal amount of horse serum injected. His reports dealt with the results attained in five patients, each of whom improved under this form of treatment." In a later communication Carroll and his co-workers[3] reported 66 per cent of cases improved, some of them up to a year. Barr and Berry[4] followed up many of these patients and reported mental improvement of varying degree in a large percentage of cases.

After preliminary desensitization, on April 25th, 1929, and weekly thereafter, altogether five separate times, the patient received an intraspinal injection of 20 c.c. of inactivated horse serum, after 25 c.c. of spinal fluid had first been withdrawn. The reaction was always the same: immediate irritation, an hour or two later nausea, and, perhaps an hour or two after that, a well marked rigor with considerable rise in temperature. By the next day there was a typical meningitis, with general irritability and hypersensitiveness, an arched back, retraction of the head, Kernig's sign, tâche cerebrale, Babinski sign, clonus and generally increased reflexes. The spinal cell count before each succeeding injection varied from 1,200 to 3,000 cells, practically all lymphocytes.

The physical effects of each preceding injection had almost completely worn off by the time of the next injection. The mental effects, however, were cumulative and amazing. Injection by injection you could see the increasing awakening of this "bench" dement; first increasing irritability, querulousness and wilfulness; then an awakening interest in her surroundings; recognition of nurses and doctors, and acknowledgement of parents. Her emotional reactions began to reappear, and to become more and more appropriate. Responses could be elicited which became more and more germane. Her reactions to food and cleanliness showed greater concern. Just before the fourth treatment she spoke casually of matters relating to her past, thus indicating a restored memory, and finally on the approach of the writer to give her this injection cried out, "When will you stop torturing me, Dr. Viner?" Things began to look very hopeful, but there was no further improvement after this injection, and after the fifth and last her interest began to lag, she became querulous, irritable and even quarrelsome and soon began to lapse into her previous state, with the exception that instead of being like a log she became noisy, abusive, and sometimes even violent.

A few subsequent notes:—

Jan. 1st, 1930. She does not speak spontaneously or respond when spoken to; is preoccupied; is occasionally negativistic, even to resisting feeding. She looks or turns away when spoken to, sometimes smiling to herself. She is probably hallucinated, but this can be judged only indirectly as the patient is non-productive. She eats, sleeps and takes care of herself poorly. The blood and spinal fluid are negative. Another series of manganese chloride injections were of no avail.

February, 1931. She is very fat; eats like a horse; filthy; incontinent. Her legs are œdematous. She is absolutely unresponsive, except to pain or occasionally to parents.

SUMMARY

A case is presented in which there was a temporary but very effective revival of a bench type dementia præcox by the induction of aseptic meningitis by a series of intraspinal injections of horse serum.

CONCLUSIONS

In this case the treatment was of no enduring value.

The suggestion is offered that this method might be of value where the patient is needed

to recall important matters of the past for medical, legal, economic or domestic purposes, or to make decisions of possible legal value, as in making a will.

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CONGENITAL ATRESIA OF THE ŒSOPHAGUS

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Congenital atresia of the œsophagus is a rare condition and it has been said that a life-time of practice, both private and institutional, may be passed without seeing a single case. This may be, but it is more likely that many cases are unrecognized. Abel[1] believes that this condition is not so rare as might be inferred from the literature. He cites the history of a case of congenital atresia of the œsophagus produced by a web at a point 2.5 cm. below the level of the tracheal bifurcation; this web was ruptured with the aid of the œsophagoscope and the patient made a satisfactory recovery. He believes that some cases in which the patient could be cured are probably considered hopeless, and he advises careful examination by means of prompt œsophagoscopy.

In this rare condition the œsophagus is divided into two parts. The upper segement, continuous with the pharynx, ends blindly a short way above the level of the bifurcation of the trachea, the lower segment opens in a normal manner into the stomach, but takes its origin from the trachea above the bifurcation or in rare instances from a bronchus (Rolleston[2]).

The case I report here is a girl, B. S., who was admitted to the Children's Hospital six days after birth. She was unable to retain any food and was having frequent cyanotic spells associated with mucus in the mouth and throat and choking respirations; there was air in the stomach and the upper part of the abdomen. She had passed nothing by rectum since birth and lost a pound and six ounces in weight. These symptoms were sufficient to make a provisional diagnosis of atresia. To corroborate this a small amount of barium was put into the œsophagus and observed under the fluoroscope. It was seen to stop at about the level of the nipple line. When the barium was evacuated I passed a 4 mm. œsophagoscope and encountered firm resistance at the point of atresia, about half an inch above the bifurcation of the trachea.

This atresia is in reality due to a secondary obliteration of the œsophagus opposite the diverticulum from which the lower part of the trachea and lungs are developed, and depends on malformations of the tracheo-œsophageal septum. Infants presenting this malformation are born well-nourished but are unable to take nourishment after birth. They die generally in the first two weeks of life. By the administration of saline by hypodermoclysis and enemata, also with gastrotomy, life may be prolonged a few days. Simpson[3] reports the case of an infant who lived 16 days with these palliative measures. The essential cause of death is the communication between the lungs, gullet and stomach which is present in the majority of cases and gives rise to pulmonary complications.

The diagnosis is not difficult. The symptoms of the case enumerated above are typical and correspond closely to other cases that have been reported.

Treatment so far has not been successful, except in those cases where a thin web constitutes the obstruction, and this can be perforated with the œsophagoscope. Richter[4] designed an operation to close the tracheo-œsophageal fistula by tying off the upper end of the lower segment of the atresic portion just before it entered the trachea. The operative approach was through the back. This was not successful.

SUMMARY

The most common form of œsophageal atresia is where there is a communication between the gullet and lungs; those which have no such opening occur less frequently and the outlook is not so bad.

Death is the inevitable outcome, excepting in

those cases where the atresia is a thin web of membrane and can be easily perforated; therefore a careful endoscopic examination should be carried out in all cases.

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Clinical and Laboratory Notes

PAINLESS SECOND STAGE LABOUR

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Painless labour, unfortunately, is exceedingly rare. To have a primipara smile and deny pain in the middle of a vigorous contraction and forcible expulsive efforts borders on the uncanny.

The patient was a farmer's wife, aged 22, height five feet exactly, and usual weight about 105 pounds. She appeared a normal little woman, with a correspondingly small pelvis. The measurements were: A.S.S. 21, Cr. 24, Tr. 29, Ex. Conj. 18. She was a primipara and her pregnancy was normal. She had had a certain number of false pains for four or five weeks before the onset of labour, which was 290 days after the last menstruation.

Labour began about 7 p.m. and she suffered the usual pains of the first stage. At 2 a.m. she had a pain which she stated was all she could bear. Immediately after this she began to "bear down" but the "pains" had stopped. For the next two hours strong contractions came on at intervals of two or three minutes and she would press very forcibly. She could not resist this compulsion to "bear down", and while this was a nuisance and there was a general discomfort all through the pelvis there was no pain. The labour would have been called very severe, if she had had the suffering one would have expected. The birth tract was small, and dilatation was slow and occurred with considerable difficulty. At length a seven pound girl was born. The head was very much moulded and there was a half inch perineal tear. This was closed with one suture. The placing of this stitch caused pain.

During the labour no chloroform or any other drugs had been used. No lack of sensitiveness to pain had been noted before or since. It was not an exhibition of Spartanism, as was evidenced by the pain suffered in the first stage and the pain experienced during the perineal repair. One can only conclude that in some manner the baby's head produced analgesia in the second stage.

VITAMIN C CONTENT OF ORANGE-CRUSH BEVERAGE

Experiments conducted to determine whether the commercial orange-juice drink, popularly known as Orange Crush, retains the vitamin C originally present in the fruit, have led the authors to the following conclusions: (1) The orange juice, unstrained, commercially expressed from freshly gathered oranges was as potent in vitamin C as ordinary hand-expressed juice. (2) When stored, either frozen or at a refrigerator temperature in this form, it lost that potency so rapidly that the loss was marked during a four-week test period, and practically complete at the end of three months. (3) When this orange juice, unstrained, was diluted to 1.7 times its volume of crush syrup by the addition of sugar, lemon citric acid, and a small amount of preservative and colouring matter, it retained the original vitamin C practically undiminished for a period of three months. (4) The antiscorbutic potency of the crush syrup was not a result of any vitamin which may have been added with the citric acid. The vitamin of the original juice appeared to be preserved by the high acidity and possibly high sugar content of the syrup. The preservative action of the acid syrup is of academic and commercial interest. (5) When the final beverage, Orange Crush, was prepared commercially from the Crush Syrup by diluting 12.3 times with carbonated water, the resulting product gradually lost its vitamin C potency. (6) When the same dilution was made in the laboratory with a minimum opportunity for exposure to air and room temperature, and the diluted and bottled product was stored in the refrigerator 10 days before feeding experiments, there was no detectable loss of antiscorbutic potency. (7) the results show that if the final dilution of Crush Syrup is done in accordance with the precautions stipulated by the Company and dispensed within 10 days, the final bottled Orange Crush retains essentially the original Vitamin C activity, *i.e.*, it contains the vitamin C from 1 c.c. of orange juice per 21 c.c. of Orange Crush. It appears therefore that a maximum interval of 10 to 14 days between dilution and consumption of the

finished product assures the presence of anti-scorbutic potency in Orange Crush as it is dispensed to the public.—E. M. and F. C. Koch, *Indus. & Engin. Chem.*, 1932, p. 351. Abs. *J. of State Med.*, 1932, **40**: 553.

A TEST FOR BLOOD

The benzidine test for the presence of blood in urine or fæces depends upon the peroxidase action of hæmatin. It is usually performed with hydrogen peroxide or ozonic ether; the former has the disadvantage that it is readily subject to decomposition, the latter that it is expensive. Mr. John Ingham, of the medical unit of the Welsh National School of Medicine, has lately drawn attention (*Biochem. J.*, 1932, **26**: 1124) to the value of hyperol, a compound of hydrogen peroxide and urea, in the performance of the test. Hyperol is said to be cheap and absolutely stable at ordinary temperatures. In the performance of the test on urine a few crystals of benzidine, two drops of acetic acid, a drop of urine, and a pinch of hyperol are brought together on a white plate; the presence of blood is shown by the development of the usual blue colour. In the case of fæces a watery emulsion is made and heated to over 60° C., two or three drops of acetic acid are added and the mixture is cooled. The test is performed as for urine, with a drop of the watery extract. If a more delicate test is desired the acidified watery emulsion may be extracted with ether and the test performed on the separated ethereal extract. An even higher degree of delicacy may be obtained by evaporating the ethereal extract, redissolving in water, and applying the test. Ingham claims that by this means blood may be detected in a 1 in 3,000,000 dilution; but the value of such delicacy for a clinical test is of course open to doubt.—*The Lancet*, 1932, **2**: 954.

A TISSUE SUBSTRATE MICROCULTURE FOR TUBERCLE BACILLI

H. J. Corper gives a simple culture method for growing small numbers of tubercle bacilli from suspected specimens that are negative on microscopic examination of smears. The method designated the "tissue substrate micromethod for culturing tubercle bacilli" is based on the fact that from 1 to 2 volumes of 6 per cent sulphuric acid will destroy undesirable contaminators and saprophytic acid-fast bacilli within from one-half to one hour at 37 C., and that blood or egg yolk, after the sulphuric acid treatment, neutralized with an isotonic solution (1.3 per cent) of sodium bicarbonate containing 3 per cent glycerin, is a good nutrient medium for supporting the growth of small numbers of human tubercle bacilli at 37 C. In control laboratory tests and in routine empirical tests with sputums negative on microscopic examinations of smears, the simple tissue substrate microculture has revealed a high percentage of positive results for tubercle bacilli, which recommends the test for this purpose in practice.—*J. Am. M. Ass.*, 1932, **99**: 1315.

RELATION OF "CHRONIC MASTITIS," CYSTS AND PAPILLOMAS TO CANCER OF BREAST.—Max Cutler points out that in the generally accepted use of the term "chronic mastitis" are included mazoplasia, cysts and papillomas. All these states are grouped together in a haphazard manner as possessing a possible etiological relationship to carcinoma. Confusion has been caused by including the separate conditions of cysts and papillomas, respectively, in the same category as mazoplasia. It is generally agreed that microscopic cysts and papillomas can be in direct etiological association with carcinoma. If the term "chronic mastitis" is limited to the process described as mazoplasia, then there is no demonstrable relationship between "chronic mastitis" and carcinoma of the breast. Examination of whole serial sections of breasts according to Sir Lenthal Cheatle's technique shows that when carcinoma complicates cystic disease of the breast, the cystic changes, the papillomas, and the carcinomas originate in the same duct units of the breast and are confined to these areas. Thus it would appear that there is a sequence of three events: (1) cystic disease; (2) papilloma and (3) carcinoma. The fact that the area of occupation is the same in the two latter states as in that of the cystic state shows as conclusively as morphological appearances can show that these pathological changes are in some way dependent on each other and that there is a sequence of events that begins with the cystic state and ends in carcinoma. A single papilloma of the breast or multiple papillomas may remain benign for many years and grow to massive proportions. In this respect they resemble papillomas affecting other organs of the body (bladder, colon). The formation of papillomas is part of a process that begins in the cystic state and may finally culminate in carcinoma. The prognosis of multiple papillomas in the breast should be regarded as bad. The prognosis of an apparently single papilloma is also bad, because unless whole sections of the breast have been examined microscopically it is impossible to exclude the presence of multiple lesions. The author emphasizes the fact that the doctrine that Schimmelbusch's disease is an innocent lesion is unsound and dangerous. The conclusion is based on statistical evidence that is fallacious. The fallacy is due to the fact that the terms "chronic mastitis" and Schimmelbusch's disease have included conditions that are innocent as well as those that are fraught with the greatest danger. The relative proportion of these separate states is not recorded in these statistical studies. Numerous examples in which local excisions in Schimmelbusch's disease have been followed by the development of carcinoma in the breast confirm pathological and experimental evidence of the potential danger of this lesion. The treatment of this condition should be guided by these considerations.—*J. Am. M. Ass.*, 1932, **99**: 2152.

Editorial

THE PREJUDICE AGAINST ALUMINIUM COOKING UTENSILS

IT is often interesting to trace the sources of prejudices. They may begin only as protests against change—mere conservatism which may be very estimable. It is only when they become fixed and embittered that they should be rooted out. An example is to be found in the prejudice so often met with against aluminium cooking utensils. Aluminium was only discovered in 1828, and has been produced in significant quantities only within the last sixty years, so that it is not surprising that it is looked upon suspiciously by that most conservative type, the housewife, when it is suggested that she use cooking utensils made of it.

This very sound instinct regarding the nature of the cooking pot has in this instance however been allowed to outrun reason. The accusations brought against aluminium so used include the following: that the metal is destructive of life; that it is not a normal constituent of living tissue; that it is a rare and poisonous metal; that it is rapidly dissolved by foodstuffs during cooking; that it causes sterility and is provocative of cancer; that it produces ptomaine poisoning; that it destroys the nutritive and health-protective constituents of food, etc. One of the most frequent charges is that of its having produced mass-poisoning at large suppers, church festivals, receptions, picnics, etc. On such occasions the food is usually prepared beforehand and allowed to stand in large containers. When extensive digestive upsets have occurred in coincidence with the fact that the containers were of aluminium the assumption has been that these were the source of the illness but the more sceptically-minded is inclined to question the quality of the food itself and its methods of preparation at the hands of the many willing but not all equally well trained volunteer cooks.

To counteract these accusations there have been many investigations into the potential dangers of aluminium cooking utensils, one of the most recently completed being that conducted at the Mellon Institute during the last six years*. They have published a very complete bibliography of all their own work and that done in other countries on this subject, and feel justified in concluding: (1) that aluminium is not a poisonous metal and does not give rise to any disease; (2) that aluminium utensils are very resistant to corrosion by foodstuffs cooked therein; (3) that aluminium does not accelerate the destruction of vitamines during cooking.

Some of the facts regarding the distribution and nature of aluminium have a direct bearing on the question of its being poisonous. It is the most abundant metal known in this world, but its close affinity for oxygen makes it difficult to separate it from the combinations in which it practically always occurs, that is, as oxides and silicates. With such a wide distribution it is to be expected that it will occur in vegetable and animal tissues, as it does, in varying small amounts. The mushroom is the only plant mentioned in which no trace of the metal has been found.

Even if it is absorbed in moderate quantities, however, aluminium is apparently harmless. It certainly gives no symptoms even when taken in amounts far in excess of what could be derived from aluminium utensils during cooking. The usual effect of large doses is a mild catharsis.

It seems from the review of the literature and the work done at the Mellon Institute to be fairly well proved that aluminium is innocuous as a substance in which to cook food, but the charges against it are frequently enough renewed to call for periodical restatements of carefully ascertained facts. The evidence as to its poisonous nature is usually vague and is seldom followed up. Such analyses as the present report are therefore of great service. H.E.M.

*A Select, Annotated Bibliography on the Hygienic Aspects of Aluminium and Aluminium Utensils. The Mellon Institute of Industrial Research, Bulletin No. 3, 1933.

MOLECULAR WEIGHT DETERMINATIONS AND THE CENTRIFUGE

IT seems a far cry from knowledge of molecular weights to elucidation of the problems of disease conditions. Yet the fairly accurate measurements that have now been made of the weights and sizes of molecules of different proteins enable us to visualize much more clearly the conditions determining the presence or absence of albumin and other proteins in urine, and help us to explain many of the changes which accompany a marked œdema. These accurate measurements depend upon the use of special ultra-centrifuges; the method of experiment has been devised by the Swedish physicist Svedberg,[1] and the results obtained by himself and his pupils.

In liquids containing finely divided material in suspension this gradually sinks to form a sediment. Sedimentation is accelerated by the action of centrifugal force, by rotation in a centrifuge. Solutions themselves are not affected by centrifuging at ordinary speeds. Ultra-centrifuges, such as that built by Svedberg, capable of revolving at a speed of 44,000 revolutions per minute, do produce sedimentation of heavy molecules in solution, such as those of soluble proteins. This is not surprising, since this enormous speed develops a centrifugal force which is 110,000 times that of gravity. The rate of sedimentation is calculated from the rate of change of the refractive indices of the solutions, recorded by photographic observations through slots in the centrifuges which carry cells containing these solutions. From the rate of sedimentation fairly close approximations to the weights and sizes of the protein molecules can be calculated.

By such measurements it has been found that the albumin of blood plasma, and of hæmoglobin, both have molecular weights of about 67,000, and their molecules, approximately spherical, have diameters of 4.8 $\mu\mu$ (millionths of a millimetre). Molecules of plasma globulin have a weight of 103,000, and diameters of 5.5 $\mu\mu$. For those of egg-albumin, insulin, and the Bence-Jones protein the corresponding figures are 35,000 and 4.4 $\mu\mu$.[1]

Of the factors governing the passage of large molecules through living membranes, which are also built up of molecules, one of the most important must be size. (Size helps to determine the passage or non-passage of particles of matter through all filtering septa.) Hence we should expect, now that Svedberg has determined these molecular sizes, that egg-albumin and Bence-Jones protein can pass through such a septum as that of the kidney glomerulus more easily than plasma-albumin, while the glomerulus will retain plasma-globulin more easily than plasma-albumin. The known facts are in agreement with this.

Bence-Jones protein can pass from blood to urine over long periods without any apparent kidney damage. When egg-albumin is experimentally introduced into the circulation it passes to the urine without difficulty. Under normal conditions both plasma-albumin and globulin are kept back by the glomerular membrane; when this is damaged, albumin passes through it more easily than globulin, so that usually in albuminuria the ratio of albumin to globulin in urine is much greater than it is in blood.

In œdemas due to increased permeability of the capillaries, the relative sizes of the molecules of the plasma proteins suggest that much more albumin than globulin will escape from the blood. Actually, the albumin concentration does fall much more rapidly, and, as is well known, in conditions of nephrosis and the second stage of nephritis, accompanied by marked œdema, the globulin content of the blood plasma is relatively but little depressed, and the albumin-globulin ratio may even be reversed. Endocrine secretions such as insulin, whose molecular size is the same as that of Bence-Jones' protein, can normally pass through undamaged tissue membranes.

Thus these abstruse and difficult experiments with the ultra-centrifuge furnish definite and simple explanations of these normal and pathological transferences of

1. SVEDBERG *et al.*, *J. Am. Chem. Soc.*, 1926, **48**: 430; 3081; *ibid.*, 1928, **50**: 3318; 1929, **51**: 3594; *Nature*, 1932, **127**: 438; etc.

different material of large molecular size. The more we can support reasonable hypotheses with sound experimental data, the further we can extend such hypotheses safely, until, progressing slowly, we shall be able not only to explain how changes occur in pathological conditions but also to devise logical and effective means to counteract some of these changes.

A. T. CAMERON.

Editorial Comments

Some Recent Canadian Researches on the Tubercle Bacillus

The December issue of the *Canadian Journal of Research* (1932) contains three articles dealing with certain important relationships of the tubercle bacillus that have been under discussion for long and still require elucidation.

The first article, by R. M. Price, deals with the types of tubercle bacilli found in human tuberculosis. Four hundred and thirty-six cases of clinical tuberculosis were studied for the purpose of ascertaining the types of the infecting microorganism. In this series 268 persons were under fourteen years of age and 168 were fifteen and over. The cases were both medical and surgical. In the juvenile group 230 were found to be infected by the human type, and 38, or 14.1 per cent, with the bovine type. In the adult group 6, or 3.5 per cent, were infected with the bovine type, and the remaining 162 with the human. Bovine tubercle bacilli were isolated from the bones, joints, lymph nodes, tonsils, adenoid tissue, meninges, and the lung (one case). In connection with the bovine infection in children it is worth noting that in every case the child had been fed on raw milk, and exposure to human pulmonary tuberculosis was denied or could not be traced. A study of the Tables presented show that, as has been generally held previously, the bovine type of the tubercle bacillus has a tendency to involve the bones and joints, kidney, tonsils, peritoneum, with a special predilection for the cervical lymph nodes. This paper affords strong support to the advocates of the pasteurization of milk.

The same author also discusses the influence of silica upon the growth of the tubercle bacillus. It is well-known that tuberculosis is particularly rife among stone-workers who are exposed to dust containing silica, and the point at issue is whether silica acts merely as a mechanical irritant or as a chemical one after entering into solution. Prof. Lyle Cummins, of Cardiff, and Prof. E. H. Kettle, of London, are among the leading investigators at the present time on the subject of silicosis and dust-inhalation. Price, in the article referred to, finds that the addition of small amounts of soluble silica to a modified Dorset egg-medium enhances the growth of the tubercle bacillus in the test tube, thus supporting the chemical theory.

In a third paper Price has investigated five cases of Hodgkin's disease, which were typical both clinically and histologically, with a view to determining the possible association of the avian type of the tubercle bacillus with this disease. In no instance was the avian form detected. It is interesting to note that in one case material from an inguinal lymph-node, typically involved, in a case of Hodgkin's disease was infective for a guinea pig and gave the human form of the bacillus. It is hoped that these investigations will be continued, for only by the accumulation of evidence such as this can we hope to settle these difficult questions.

A.G.N.

The Utilization of Physiotherapy in Hospitals

Enquiries are received from time to time respecting the development of physiotherapy departments in hospitals and the staffing of such. Practically every general hospital of any size has certain physiotherapy apparatus and many have most extensive equipment. More and more it is being realized that physiotherapy has a distinct place in the treatment of the patient —possibly not as dominant a position as has been claimed for it by the ultra-enthusiast, but certainly a more vital rôle than has been realized by a large proportion of the profession. It is being realized also that any analysis of the costs of sickness must take into consideration the time-factor, the period under treatment, and the time away from work. With the increasing accuracy and efficiency of medical and hospital care, costs are bound to rise, but if formerly partial cures become complete ones, and if patients return to work in a fraction of the time formerly required to convalesce, the actual cost to the individual and to the community may be, and has been proved to be, considerably less than formerly.

Physiotherapy has proved its value in traumatic cases, in arthritis, in deformities, in diseases of the nervous system and in abdominal and many other conditions. Its value in post-natal care, to avert the "tired mother" syndrome, is becoming more appreciated. However, as pointed out in this *Journal* in a recent series of articles on physiotherapy and roentgenotherapy prepared by the Radiological Section of the Canadian Medical Association,

"*Monotherapy* is by no means *physiotherapy.*" Failures are frequently due to too implicit reliance upon one or perhaps but two pieces of equipment, a situation comparable to that of an internist limited to but one drug. Moreover, there is a growing realization that physical treatment gives best results when in the hands of those especially qualified. Dr. James Mennell, of St. Thomas' Hospital, speaking before the recent Public Health Congress, emphasized that "in all treatment the skill is with the administrator and not with the apparatus."

In most of our hospitals where the equipment is sufficient to warrant the creation of a department or service, a member of the medical staff, frequently the roentgenologist, is in charge and he is assisted by one or more technicians. In some hospitals a specially trained Sister is in charge, with a physician appointed in an advisory capacity. In certain large institutions a full-time medically trained physical therapeutist administers the department. We are particularly fortunate in Canada in having available as workers in these departments graduates of the two-year course in physiotherapy which is maintained by the University of Toronto. Some of these students have taken the combined three-year course giving them a diploma in occupational therapy as well. During the last few years internships in physiotherapy have been established in connection with this course in hospitals in Winnipeg, London, Hamilton, Toronto and Montreal. Owing to the necessity of protecting the public, hospitals and the profession from unqualified assistants, the Canadian Association of Massage and Remedial Gymnastics was formed some thirteen years ago, a body similar in purpose to the Chartered Society of Massage and Medical Gymnastics in Great Britain. Only fully qualified persons are eligible for membership, and the members bind themselves to work only under medical direction and not to advertise in any way, except in recognized medical journals. Such an ethical group of trained workers deserves the hearty support of the profession and the hospitals.

A more detailed account of this Association can be found elsewhere in this issue, under "General News." HARVEY AGNEW

The High Cost of German Medical Journals

We have before now commented on the difficulty which medical libraries on this side of the Atlantic are having with regard to the high cost of German periodicals.* Without repeating the details, it may be recalled that in the larger and medium-sized medical libraries in North America the annual cost of these periodicals averages about two-thirds of the entire amount spent on all current medical journals. That is an entirely disproportionate charge. If we could be shown that these journals are that much more valuable than those of any other country in the world the charge might seem justifiable. But there is no attempt at such justification on that or any other ground, even by the German publishers. Purchasers of German medical journals are simply made to pay what the publishing houses like to charge, and no protest has yet had any effect. The weakness of the situation so far has been that the libraries (the main buying source) will not act together in the matter, and the German publishers are only too well aware of that weakness. There is however a growing spirit of resentment amongst those concerned with the buying of these journals which is gradually bringing about an agreement on concerted action. It would only require a short period of combined abstention from buying for the publishers to adopt more reasonable methods. In Great Britain certain measures have been adopted by which the orders for German medical journals have been considerably lessened, notably by the sharing of certain special journals. Conditions do not favour similar methods on this side of the Atlantic. Nor does the German offer to establish agencies over here contain the likelihood of any effective relief. What is needed is a large reduction in the cost of the journals, and the libraries should steadily and firmly insist on it. They will need all the firmness they can command, as they are dealing with strong organizations behind whose demands there is a cynical disregard of fairness.

H.E.M.

The Montreal Dermatological Society

We would draw the attention of our readers to the announcement (p. 467) in this issue of a post-graduate course in dermatology, to be given in Montreal this coming June. This course is unique in being the first attempt at post-graduate teaching in both French and English hospitals in this city. A comprehensive and interesting program has been arranged, and it is expected that many will avail themselves of the opportunity to refresh their knowledge of dermatological subjects. H.E.M.

* This *Journal*, 1932, **27**: 63.

Special Articles

EDUCATION AND MEDICAL LEARNING

By H. ALAN SKINNER,

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The history of medicine during the past fifty years has been that of a period of rapid advancement and expansion of medical knowledge. Medical science as we know it to-day is largely a product of the last half century, and the student of 1880 would be bewildered by the present-day curriculum, the methods of instruction, and the subject-matter covered.

The development of medical knowledge has been along two principal lines. The first has come as the natural result of the study of the subject by improved methods and through the use of modern instruments. As the study of any subject becomes more intense knowledge of the subject is increased, is more exact and more detailed. The second line of development has come from outside, by the application of the discoveries of science to medicine. X-rays and radium would come under this latter heading, as would also such things as diathermy, the cystoscope, and the electrocardiograph. If one were to pursue this subject closely it would soon be apparent that medical science and medical practice have made use of, and are concerned with, the knowledge of physics, chemistry, biology, economics, architecture, engineering, law; in fact there is scarcely a subject which involves study and investigation that does not, in some way, touch medicine.

Naturally, the widening of the knowledge and scope of medicine, and the introduction and adaptation of the discoveries of other sciences, have had a profound effect upon the teaching of medicine. The use of the microscope has resulted in the creation of two distinct branches of medical science which are whole subjects in themselves, histology and bacteriology, to say nothing of the expansion of general pathology which has resulted from the use of this instrument. Thus developments from this source (the microscope) have profoundly altered the medical curriculum. Therefore, as one would expect, the length and scope of the medical course has altered repeatedly during the past fifty years. Within this period we have seen the three years' course expanded to the four years' course, the four years' course give way to a five years' course, and, finally, the more or less general introduction of a six years' course of university study leading to the degree of M.D. In the combined courses which lead to the degrees of B.A. and M.D., there has been a parallel increase, so that the period of university training for students following the latter course has now reached as high as eight years. This gradual increase in the length of the course of undergraduate study has been due to both the expansion of existing courses and the introduction of new courses. It is obvious that the scope of medical science and the field to be covered in the teaching of medicine have grown by leaps and bounds. Medical schools have not willingly added years to the course of instruction, but have yielded to the pressure of increasing demands which could not be set aside.

As increasing knowledge in each and every branch caused a steady expansion of the curriculum, it also produced another and not unrelated effect. It brought about the creation of a group of practitioners who came to devote their time solely to the study of one subject and thus became specialists in a particular field. These specialists, naturally enough, have tended to teach the students a more and more specialized subject, with the result that various specialties, as such, began to appear in the curriculum. Every year additions are made, and large additions will continue to be made, to the sum of medical knowledge. If this results in increasing specialization it should be unnecessary to state that the situation will rapidly become so complex that more and more years of study will be required in order to master the subject matter. As the course is already a long and difficult one for the undergraduate in medicine, it seems to be not only desirable but imperative that medical education be examined in its essential features. Such a consideration, while primarily directed at the course of undergraduate study, must also of necessity include the question of post-graduate instruction, and should determine what is required in the undergraduate course and what may be left to post-graduate study.

THE DUTIES OF A MEDICAL SCHOOL

Every medical school is faced with the problem of fulfilling three major obligations. The first of these is the teaching of medicine—the training of the undergraduate student. This is the immediate duty of the faculty, and should be the first thought in the minds of all professors. The second duty of a medical school is to advance, in so far as it is possible, the knowledge of medical science and the treatment and cure of disease. This falls under the head of investigation or research work, and is a constant challenge, an opportunity for service, and an obligation handed on by a long line of in-

vestigators whose names make up the history of medicine. The third duty of a medical school is to its graduates, and thus, indirectly, to the general public, in making available to all the most recent discoveries, the latest methods, the largest opportunity for efficiency in medical practice that it is possible to achieve in the district served by the school. This may be done in various ways, namely, by publication, by clinical congresses at the school, by refresher courses, by the projection of the clinical departments throughout the district by means of lecturers, by medical society meetings, and so on.

THE INFLUENCE OF LOCAL CONDITIONS

In any country or district the establishment of a medical school necessarily follows the development of the region from an agricultural or industrial standpoint. As the district develops a certain town or city becomes the recognized business centre, and in this centre there follows a social, educational, and cultural development. It also becomes the logical centre for medical services, the erection of hospitals, and finally, in certain cases, the establishment of a medical school.

This has been the case to a certain extent in Canada. For a time only the older schools in the eastern part of the country were in existence, but in recent years medical schools have been established, along with other university faculties, in a more regional manner, so that centres of learning have sprung up in the larger cities in every province of the Dominion. We have thus developed in Canada a number of schools which have come into existence, to a large extent, from the need of a medical centre in a given territory; these are schools with definite territorial associations and with a duty in medical service in a particular district.

If one examines the various medical schools of this country from this territorial angle, keeping in mind the three major duties of a medical school already indicated, some interesting conclusions may be drawn. In the first place it should be noted that the size and scope of any school depends to a certain extent on the population of the area which supports it. Since the majority of the graduates of any school will eventually enter practice, and as the average graduate goes into general practice, most schools will be concerned with the teaching of students in order to fit them for general practice.

At the same time some of the larger centres, as for example Toronto and Montreal, have certain advantages due to the large population concentrated in their districts. This affords greater clinical facilities, with large hospitals and great numbers of patients. Thus these larger cities have an opportunity for developing post-graduate teaching that is lacking in the smaller schools with a wider and less concentrated territory.

The second consideration, research and investigation, is not dependent on population, although workers in certain clinical fields undoubtedly benefit from a wealth of clinical material. But research does not necessarily follow either a large population or financial resources, but may be done in any place and at any time by any worker with patience and imagination. Thus any school may foster, encourage, and develop research, although the larger schools have undoubtedly certain physical advantages.

Thus one is able to observe in the various civilized countries that the large cities in each country have become the centres for post-graduate training. Cities like New York and Boston in the United States; London, Edinburgh and Dublin in the British Isles; Paris, Berlin, Vienna, on the continent, these large centres of population, have inevitably become the centres for post-graduate study. In these centres also, the leading specialists tend to congregate, thus increasing the advantages in the field of special studies. For a time, however, the development of specialties and special departments in these larger centres had a peculiar effect upon the profession. It tended to interest the undergraduate students at these large schools in special fields to a high degree, so that many of the undergraduates aimed at special practice. Thus the idea of general practice, already removed from the minds of the teachers, became obscured in the mind of the student.

At one period it seemed as though this condition would have a disastrous effect. So many students were attempting to crowd into the specialties that the supply of general practitioners was threatened, and it appeared as though the family doctor were about to vanish from the scene. At the same time the specialties became over-crowded, with a lowering of the ethical standards, the introduction of fee-splitting and competitive bargaining and other doubtful practices. To a certain extent this condition has become corrected by the establishment of smaller medical schools in the various provinces and the improvement of the teaching in these schools. Many of these schools have definite territorial associations which are non-urban and to which they have a definite obligation for medical service. These schools have, therefore, in many cases set themselves to train their students for general practice, leaving to post-graduate schools the teaching of the specialties to graduate students. This process of differentiation has been gradual and not particularly obvious. Nevertheless it is now true to such an extent that official notice should be taken of the situation and a definite differentiation made between the training of the under-

graduate and the graduate. A step in this direction has already been made in an official manner by the creation of the Royal College of Physicians and Surgeons of Canada. This has for its aim the regulation of the specialties in Canada, but so far its influence has not been felt to any great degree and it will probably be some time before the College can be said to control the situation.

The next step in the solution of the problem appears to be up to the medical schools themselves. It will consist of definitely separating the course of undergraduate instruction from specialized graduate study.

The training of a medical student might be summarized under a number of headings signalizing the various steps. These could be labelled as follows: matriculation, basic studies, fundamental medical science, general clinical training, and, finally, specialized training. When the undergraduate has proceeded to the end of the course of general clinical training he should be trained sufficiently for general practice. At the same time his training should have been such as to afford a sound foundation for the study of a specialized subject should he by reason of ability, inclination, or opportunity be suited for the pursuit of a specialty.

THE NATURE OF THE UNDERGRADUATE INSTRUCTION

If what has been said up to this point has any value it should be possible to limit the problem of the course of undergraduate instruction within reasonable bounds. If it is possible to divide the teaching of medicine into a general undergraduate course and special graduate courses then the post-graduate instruction ceases to be a concern of those identified with the training of the undergraduate student, and can well be left to those centres best able to supply this type of instruction. All medical schools, however, must deal with the question of the general training of the undergraduate, and it therefore seems desirable at the moment to determine what are the essential points to be considered in the construction of a medical curriculum.

It seems immediately evident that the general course of training must satisfy two requirements; it must train the student for general practice and it must at the same time provide a sound foundation for future specialized study should that be the eventual aim of the student. However, since a general training is desired, too much specialization must be avoided. The time of the student should be arranged so that his efforts are concentrated upon the six major subjects of medical learning and a connected story be presented to him. In the fundamental sciences these subjects are anatomy (including histology, embryology and neurology), physiology (including biochemistry), and pathology (including bacteriology). In the clinical years the three major divisions of medicine, surgery and obstetrics (including gynæcology) complete the six major subjects. In concentrating the attention of the student on these major divisions it should be possible to limit the complexities of the time-table and confine it within reasonable bounds, thus presenting to the student a more coherent and straightforward course. At the same time it is not necessary to lose sight entirely of the more important specialties. For example, pædiatrics as a special branch of medicine cannot be ignored, and requires special treatment. Yet the various specialties need not be unduly emphasized to a point of unbalance, but presented in such a way as to be complementary to the major subject of which they are an offshoot. Thus it is possible to give the student an insight into the material, scope and possibilities of the special field without burdening him unnecessarily with a mass of information which he commits to memory solely for examination purposes. There is a definite point beyond which special instruction should not proceed in the undergraduate course.

The "cramming" test might be applied as a measure of the extent of any course. Whenever a student has to "cram" information by the memory route in order to pass an examination his education is retarded for the time-being. Much cramming can be avoided by reducing special courses and specialized knowledge to a minimum, and substituting for unprofitable memorization the habit of independent thinking. *When thought is combined with training in practical applications, so that the student is able to think and act on his own initiative, the main objective in his education has been reached. Ability to think independently is more certainly the hall-mark of a university training than a good memory.*

When the physician stands by the patient's bed he brings to the consideration of the case only one important piece of equipment — his ability to think clearly and logically. Surely this fact stands out with sufficient clearness to influence us in our methods of instruction. The man who can recite a list of facts from memory is of little use in medicine unless he has the ability to apply his knowledge to the problem presented by the patient. What is true to-day may be false to-morrow, and things which at one time were accepted as uncontrovertible facts may, with fuller knowledge, become changed or modified. Thus memorized knowledge may fail, but ability to think independently will always be an asset. If the student is to be taught only two things let us be sure that these be logic and the scientific method; then the facts will take care of themselves. Thus, instruction in medi-

cine should be by tutorial guidance and example rather than by didactic dogmatism.

THE TEACHING OF THE FUNDAMENTAL SCIENCES

While in this discussion the more basic sciences of physics, chemistry and biology have not been prominently mentioned, it is to be understood that what is said in reference to the medical sciences applies in a similar way to the basic sciences. When we approach the question of the teaching of the fundamental sciences we find we are near the crux of the whole matter. There is no doubt that the methods of study and the habits of work which may be inculcated in the student during the early years of his course affect the later teaching and progress of the medical undergraduate to such an extent that they are a direct index of success or failure in medicine. Without proper training in these fundamental sciences the student has little or no chance to grasp the significance of clinical teaching or to comprehend the underlying fundamental nature of the problems which confront every medical practitioner. Such a student may pass examinations, but he does so by means of a good memory with, perhaps, a pleasing personality, and not by virtue of any real understanding of the principles upon which intelligent medical practice should be founded. In the teaching of each of the laboratory sciences the problem is more or less the same. If we choose anatomy as an example it is simply because it is more familiar than the others; it does not affect the nature of the problem or its solution.

When the student enters upon the study of anatomy he discovers a subject in which fact predominates and theory is not prominent. A dictionary of anatomical terms contains thousands and thousands of words. When one considers that each of these terms may represent something which has ten or a dozen important associated facts it should be at once apparent that a course of instruction based on a memory system is bound to fail, and that some other basis for teaching must be sought.

It is a general observation that the average student in a secondary school can proceed to matriculation on a good memory and without ever having had to do much independent thinking. In many cases he has been trained to pass examinations by a memory method. But when he reaches the university this memory method beings to fail, and he must either begin to think for himself or fall behind. It has been an experience in the teaching of anatomy that this course is the rock on which many memory systems are shattered.

This, briefly, is the work which lies before the instructors in the fundamental sciences. They must take in hand students who have been accustomed to learn by rote and teach them to think for themselves. If the instructor fails to teach the student to think, and merely requires him to commit to memory a number of facts, then that course of instruction fails to advance the education of the student. The average student who enters a medical course is a fairly able, bright, intelligent lad. He may never have been taught to think for himself, but in most cases he can be taught to do so, and that quite easily. If the instructor will take the trouble to make the first steps in constructive thought easy and logical it will not be long before the student is stepping out briskly by himself. In the course in anatomy the major portion of the teaching should be done in the first few months; after that very little is needed to keep the class running under its own momentum.

Since this type of instruction is best carried on individually, or in small groups of three or four, it is evident that small classes under capable and discerning instructors are to be desired, particularly in the early years. In some schools the reverse order is the rule, and the results must be doubtful. If large classes are given mass instruction in the fundamental sciences and then split into small groups for clinical instruction it should be apparent that the students who have not had adequate training in independent thought in the early years will be a trial to the clinician in the later years.

Further than this, it should be pointed out that there has been at times a tendency to restrict the teaching of the fundamental sciences to those facts which are capable of practical application. This is most certainly a step in the wrong direction. In the first place who is to say what is capable of practical application or what is not? Again, to teach a subject solely as an introduction to another subject is to miss the meaning of the word education and to shackle university training in its principal sphere. It is true that, since a selection of material must be made in a medical course, it is wise to select the most suitable material. Thus a student might be trained to think and to develop a scientific method in a course in geology or astronomy; but we do not select these subjects in place of physics, chemistry and biology. Similarly, an effort may be made to select those branches of physics or chemistry which have most bearing on medical science, but in the long run *it is the comprehension of principles rather than the memorization of fact that is bound to be most beneficial in the process of education.*

THE ESSENCE OF MEDICAL EDUCATION

While it is true of the study of any subject that a knowledge of essential principles is more important in obtaining a comprehensive grasp of the matter than a mere knowledge of fact, in medicine it is not only important but is prac-

tically imperative. The science and art of the practice of medicine as we know it to-day has reached out in all directions until it includes within its scope almost every scientific avenue and source of information. Very few scientific discoveries are made that are not applicable in some manner to medical practice. Thus it seems extraordinarily important that the student who embarks upon the study of medicine should be carefully instructed in the fundamental sciences in a logical manner, so that his later path may be clear and unconfused.

It is a matter of common observation that the student who is well grounded in anatomy, physiology and pathology has little difficulty with his clinical work. "Know the normal well and the abnormal will be readily apparent," is an old maxim for success in medicine. No school ever made a mistake in insisting on sound fundamental knowledge in its students.

The medical school of to-day has these problems in medical education on its hands. The increasing scope of medicine, the application of scientific principles to its problems, and the general advancement of medical learning, require clear-thinking doctors, well versed in fundamental principles. It has been suggested here that two important considerations should be determinative in the education of a medical practitioner. The first has been the advisability of more definitely separating medical training into a general undergraduate course and more specialized graduate courses. The second has been the importance of the nature of the teaching of the fundamental sciences in the early years.

It is to be hoped that the efforts of those who are striving to elucidate the problems of medical education will meet with success, and that plans for the future may be such that the efficiency and prestige of the medical profession may continue to flourish.

Men and Books

INDIAN MEDICINE IN BRITISH COLUMBIA*

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I would like to give you briefly an idea as to how the Indians of the coast used to live. They were quite different from the usual Indian that we read about, who lived in wigwams. With our big trees, logs have always been plentiful and as the cedars split easily, they were able to make wide boards, or "shakes" as they are called, with which they built their houses. Beside the home in the village, each family had his camp on his own particular hereditary salmon river and trapping ground. These camp houses were built of the split shakes tied together with cedar bark rope, and if the Indian wanted to move for any reason, the house was taken apart, the boards piled across two or more canoes, and slowly propelled by paddle, wind and tide to its new destination. The only means of travel from place to place up the coast is by water, for there are numerous islands, and, also, the shores of the mainland are so mountainous and winding that roads are out of the question. The village consisted of a number of large houses built with huge logs for beams and walled in and roofed over with these shakes. Each house might be anywhere from thirty to fifty feet in width and perhaps twice as long. A big fire in the centre of the earthen floor served for heating, cooking and ventilation, plenty of cold fresh air coming in through the cracks between the shakes. As a number of families lived in each of these houses, they were the original apartment houses, but did not have the same unhealthy features (of steam heat, etc.) that the modern ones have. In the Christianized villages these houses have been replaced with our style of house, and I think the change was not good until they learned to ventilate them properly.

These Indians have always had an abundance of food with a considerable variety. It was impossible to do much gardening, but there were berries of several kinds, wild rice, wild crab-apples and plums. Deer, mountain goat and bear were plentiful, while the sea abounded in salmon, halibut and codfish. Clams, crabs and other shell fish were also plentiful. Halibut is such a common word amongst the Indians that one of our teachers who was teaching the children to say the Lord's prayer, found that one little chap was saying, "Our Father who art in Heaven, 'halibut' be Thy Name." Large quantities of these foods were dried in the sun, and, while harder to masticate, they had two advantages—their vitamin content was increased rather than lost, and the teeth were given so much work to do that they had not time to decay. Many of our old Indians die with every tooth in place, although some are worn almost down to the gums.

An edible form of seaweed, gathered each spring and dried, provided iodine, iron, and acted as a laxative. Herring-spawn, gathered

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by suspending hemlock boughs in the water where the herring were gathered in large numbers, and then dried in the sun and wind, would keep indefinitely. The food which they would miss more than any other is an oil made from the oolachan or "candle-fish." This fish, so-called because when dried it will burn like a candle, is about as long as a herring, but more slender. They run in countless numbers up certain rivers each spring and are then caught by the ton. Many of them are salted, some are smoked, but the most of them are placed in large vats hollowed in logs, or more latterly made of lumber. If it is sunny weather, they are left to render themselves, but if necessary stones are heated and put in with the fish to hurry the process. The oil is skimmed off and stored in anything available. Since the advent of the white man's coal oil and gasoline tins, they have an abundance of receptacles. The way the Indians repair to the oolachan fishing and oil-rendering reminds an easterner very much of the busy times in the maple woods at syrup-making time. Personally, I would prefer the syrup, but a native's meal is incomplete without a little of this oil or grease. The Indians consider it a medicine as well as a food. It is used for gastritis or excessive vomiting due to any cause. So far as I know, it has not been assayed, but, especially when prepared in the sun, the vitamin D content should be high.

Obstetrical practice amongst the natives is not very thrilling, many of the babies being two or three days old before the doctor knows anything about them. The only two maternal deaths I have heard of were due to infection from retained placentas. The younger women are becoming so civilized that they must have a doctor. In the good old days, and even yet, many of the women work up till the day of delivery and are at it again in a day or two. It was not unusual for a baby to be born in the canoe in which the family were travelling. Every year or two, even now, a baby is born in the gasoline launch in which the parents are travelling from their homes to the canneries.

While some of the native midwives attempt to extract the baby in delayed cases, they have no instruments except their fingers, and I do not think they accomplish very much. As a rule, there is no interference, and though the bedding and bed may be very dirty, there is rarely any infection. Usually the room is darkened, if the woman is sick in the day time, and a dimly lighted lamp is placed in a far corner. Three or four old women sit on either side of the patient who is usually on a mattress on the floor. They support the patient, help her to change her position, and utter occasional words of encouragement. On the whole, there is very little said and the silence and darkness make it a very solemn occasion. When I am called and find on external examination that the case is proceeding normally, I leave it to the women, though sometimes I wait to see what happens. One day, as soon as the baby was born, one of the attending women picked up a pair of scissors from the floor, walked to the window, tore a strip from the cotton rag that was serving as a sash curtain, tied the cord with it and cut it with the dirty scissors. I was so amazed that I couldn't interfere. However, both the mother and the baby got along well.

About 50 per cent of our native babies are born with a bluish discoloration of the skin in the sacral region. It is called the "Mongolian" spot, because Japanese and Chinese babies have the same characteristic. This opens a very interesting subject and while I have made some investigations in regard to it I only mention it here.

Some of the tribes are very superstitious about the birth of an infant. One cold rainy night, when I returned quite late from a trip, I found that an old Indian patient had been trying to get away from the hospital all day. The nurses would not let him go without my consent. Upon questioning him, I found that he had learned that a baby had been born in the hospital that morning, and he believed that some other occupant of the building would have to die to even things up. So far as he could see, he was the most likely candidate, and though he was barely over a severe pneumonia and had no friends at the only accessible cannery, he insisted upon leaving, and out he went into the rainy night. That is the last I have seen or heard of him.

There are very few cows up the coast and it is very rarely that an Indian child gets fresh milk. Most of the women nurse their babies until they are fifteen months old. There are a surprising number that cannot nurse them at all. Condensed milk is used for infant feeding to a very large extent, though as soon as a baby is able to cry for it, he gets anything he wants, even to soda water, which the Indians drink by the case. Naturally there is a high infant mortality, though in the village where there is some supervision, they are doing better. On the whole the population is increasing.

While the incidence of tuberculosis is several times that found with whites, there is not so much of it as one is led to believe. Some fail very rapidly when the disease starts but others show a very surprising amount of resistance. While the pulmonary form of tuberculosis is most common, as one would expect where no raw milk was being used, there is quite a lot of the glandular type, though less than there was fifteen years ago. I would say that the spine is most frequently affected, after the glands, probably about as often as the other

bones or joints combined. Tuberculous meningitis is a very frequent cause of death in children. Hospital treatment is well worthwhile for the ordinary tuberculous Indian, as the response is usually very satisfactory.

Syphilis is seen fairly often. Many in whom we suspect it give negative Wassermann tests. Gonorrhœa is common, and while the men apply for treatment the women do not, unless there are acute symptoms, which rarely occur.

I shall refer to the medicine-men, but as they confined themselves to magical or spiritual practices, I would like to mention first the various other methods of treatment, such as by herbs, scarification, etc. Mr. Harlan I. Smith, of the Department of Anthropology, Ottawa, has compiled a Materia Medica based on information received from the Bella Coola Indians, and the Indians on the upper Skeena River, which is very complete. I will only mention a few of the common things in use.

One of the commonest of their own remedies, of which they have an inexhaustible supply, is sea water. When I went into a house one day I found the owner, an elderly chief, sitting on a chair, with his head in his hands, his elbows resting on his knees and a big basin between his feet. At his side was a tea-kettle and on a chair beside him a cup. As he looked most dejected, I asked him what he was doing. He replied, "Oh I am just taking some salt water. I didn't feel well this morning." He had gone to the beach, filled the tea-kettle with salt water, heated it, and was now drinking it. There is no doubt about its action as an emetic when taken freely as this man was doing; in fact, it cleanses the whole alimentary tract. If a person isn't well, the Indian's first thought is of his intestinal tract, but instead of calling the trouble by some big name, such as intestinal toxæmia, auto-intoxication, etc., he simply says, "There is too much green inside," and asks for a cathartic of some sort. While some still use salt water, it is too strenuous for the modern native, who prefers the white man's salts or castor oil. And they get away with a lot of that. The bark of the "devil's club" is steeped and the infusion used as a cathartic. This is used by the hunter before starting on a trip, as he believes a course of treatment with it will not only make his physical strength greater, but will give him greater courage and he is sure to be successful.

The bark of the white fir was boiled and the decoction used in tuberculous cases. Many other things were used, among them an infusion of the needles and small branches of the jack-pine or spruce, for the same purpose. Extracts from fern roots were taken internally for worms, which is not so far from our use of the male fern in cases of tapeworm. Juniper was used as a diuretic, mint for pain in the stomach, and the leaves of Labrador tea as a simple beverage. The skin of the common nettle was and still is used in eruptive conditions. One of the most universally used herbs is the false hellebore or veratrum viride. As I have seen it being used in all the villages I visit, I asked if it was being used in other places, and the Indians said "yes." Eaten raw the roots are considered very poisonous, and I do not doubt it. As an infusion of the roots, it is employed very freely as an emetic and purgative. After steeping several of the smaller roots in two quarts of cold water for six days, it is used for common colds and influenza. As the action is somewhat similar to aconite, according to our materia medica, this would probably be good practice. An extract made by boiling the roots for half an hour is rubbed into the scalp for headaches and neuralgia, and also is used as an embrocation in case of sprained joints. The juice from the ground roots was used locally to remove rheumatic pains. For very resistant cases, the skin over the affected part was whipped with spruce boughs, and if any of you have rubbed against a spruce you know how sharp the needles are. After the skin had been well punctured and was bleeding freely, the juice was rubbed in. One treatment is said to have brought about a cure. I think one would be all a person would care to have. The dried root, ground to a powder and encased in tallow, was taken, and followed by salt water, to remove hair balls or other foreign bodies from the stomach. Burnt to charcoal and pulverized, it was given to new-born babies to remove meconium. Whenever there is "flu" around, or any epidemic condition, one sees the roots on the top of the stove in most of the houses. As it slowly burns or scorches it gives off fumes, which the natives think have a disinfectant value.

Another favourite remedy was counter-irritation. We see many with scars of burns about joints or with linear scars caused by sharp instruments. Powdered veratrum leaves were placed in a little periwinkle shell and bound against the skin till a blister formed. The powdered root was sometimes used. After setting fire to it, it was placed on the skin at the desired sites. Cast off snake skins, which are rare up our way, were rolled into tight rods, ignited and used for blistering. For chest colds, a shirt would be soaked in veratrum extract, dried, and then worn next the skin. Sharp stones and, later, knives, were used to make multiple shallow incisions and I have often been told how much better they felt after "the bad blood" was let out. The Indians on the west coast of Vancouver Island are especially fond of this, and their bodies are literally covered with such scars. We had a patient recently who had been quite a sprinter. His

legs and thighs were covered with vertical scars. He told me that a couple of weeks before each race he had his legs scarified this way to let the old blood out as he believed he could run faster with all fresh blood in them. Wet cupping was sometimes done, the native who performed the operation using his mouth as the cup. In spite of lack of antiseptic precaution, there is little evidence of these incisions having suppurated, though the burns were very slow in healing.

Spruce gum or pitch was used a great deal for dressing wounds and for poulticing boils. Fractures were immobilized crudely with splints and this gum, and they tell of remarkable recoveries due to such treatment. I had a boy from the west coast where the Indians rarely have access to a doctor, who had several nasty sinuses secondary to Pott's disease and cervical adenitis. We treated him during the summer in our hospital and when they left after the fishing season I thought I was saying a final goodbye to the lad. To my surprise he was brought back the following season, and though his spine was much more deformed the sinuses were in far better condition than when he left. Imagine my surprise and disgust when they told me that they had been using cow manure. Outside of the old fashioned community houses in which the Indians used to live was a receptacle in which urine was stored. The sediment from this was used for cleansing purposes, and it was also used for running ears, and was snuffed up noses for colds in the head.

Steam baths were employed, the patient sitting over a tank of water, and, after being draped with blankets, hot stones were thrown into the water till he perspired freely. Sometimes, the leaves of the western dock or of a small form of kelp were placed over hot stones and he lay on them till he was perspiring. This was followed by a plunge into the salt water and sometimes by a hot wild cherry drink.

Abscesses were incised, though not until the skin was very thin over the pus, so far as I can find out. A sea lion whisker was used as a filiform bougie in case of stricture with urinary retention.

The so-called "Flat-head" tribes of Vancouver Island deformed the heads of their infants by strapping them between two boards which met at the top, causing the forehead to slope sharply back from the eyebrows. According to Garrison, ovariotomy and trephining were practised by the North American Indians, and Mr. Smith, of Ottawa, found two skulls at Boundary Bay, a few miles from here, that had been trephined. I have here to-day one which was found in the midden at Eburne. Dr. G. E. Kidd, of Vancouver, a former professor of anatomy at Queen's University, states that it shows unmistakable evidence of trephining. It is of such interest that I would like to quote from his description, which I will condense as much as possible.

> Taking the depth of the midden, and by counting the rings of stumps of trees growing over it, we may assume that its age (the skull) might be as much as one thousand years or more. The skull is one of a young adult male—dentition is perfect. The left parietal bone is forced outward, opening the sagittal and left parieto-occipital sutures throughout their entire extent. In the occipital region of the skull there are two openings—a larger one situated just above the external protuberance, and a smaller one lying two inches lateral to this. The larger one is circular, being saucer-shaped, with a surface diameter of forty mm. The surrounding bone shows evidence of healing for a period of time extending over some weeks at least. The smaller opening shows no signs of healing. The diploe are open, the edges are sharply marked, and scratches made by a cutting instrument are to be seen on its walls. It barely pierces the inner table at two points. The remainder of the floor is exceedingly thin. This suggests that the operator approached the interior of the skull with great caution, that he had a steady hand and a sharp instrument. This was probably a small spoon-shaped scraping tool, the bone being removed in small shreds or chips. There are no marks on the skull surface about the opening such as might be made by the instrument slipping. It seems to be a clear case of ante-mortem trephining, the larger opening having been made some time prior to and the smaller one immediately before death. The fact that the last opening barely perforated the inner table would indicate that the operation was not completed, the probability being that the patient died while it was in progress.

Among the American aborigines, according to a Dr. Muniz, the operation was performed by the medicine-man. They believed that all headaches, dizziness, fits, etc., were caused by an evil spirit enclosed in the skull. An opening was made through which it might escape. Rev. Mr. Raley, of Sardis, who loaned me some of the exhibits here to-day, relates that he had been approached by an Indian who suffered from chronic headaches. He requested that Mr. Raley bore a hole in his head to allow the evil spirit causing them to get out.

Dr. Tunstall, in his presidential address when this Association met in Vancouver for the first time, seventeen years ago, said among other things, "Those who have made a special study of the practices and customs of savage races inform us that the primitive doctor or 'medicine-man' was not that self-conscious fraud and humbug he is commonly thought to have been, but a person with a real belief in his own powers and cures, and that those cures, when genuine, were generally, if not always attributable to hypnotism, especially that phase of it known as suggestion. A state of hypnosis was induced in his patient by the monotonous droning of the medicine song and the noise of the drum and rattle. When in this condition, his

attempt to extract the spirit of the disease from the patient's body, and his statement that he had presently done so, acted suggestively upon the imagination of the patient and effected his cure."

In common with other savages and unenlightened peoples, the Indian looked upon illness as the result of evil spirits or witchcraft. Accordingly, the way to cure the patient was either to drive out the spirits or find the person who had bewitched him. As this required supernatural powers, certain individuals trained themselves or were trained as Shamans or medicine-men. It was no easy thing to become a doctor even at that time, as it not only required skill in psychology and sleight of hand but the power of physical endurance. To acquire the supernatural power, the neophyte had to retire to the mountains, fast for days, and thus get into communion with the spirits of the natural elements. Rev. Mr. Crosby quotes as follows:

> After such a fast, usually of ten days' duration, the young candidate, nearly overcome with exhaustion, started out as if he had come from another world. He believed that he had been taken possession of by a mighty spirit. After reaching the village, the lithe young body would be thrown about the great room, and by a power uncontrollable would be doubled and twisted and knotted into a hundred contortions like a fowl deprived of its head. Crowds would gather to see the manifestation of this mighty power, none doubting its genuineness. After this there would be more fasting, and cleansing of the inward man by drinking large quantities of salt water and vomiting it up again. He must again commune with the spirits and the wild beasts, and tear and eat their flesh while yet quivering with life and drink their warm blood to make his strength more fierce to do battle with the evil spirits.

Returning to the village, he had to commune again with the wise men, conjurors and older medicine-men. It was a strenuous time, but parents were quite willing to have their sons try for it, though they died in the attempt.

Dr. Geddes Large, of Port Simpson, gave me the following description of one session he viewed secretly. The "doctor" was decked out in war paint and ceremonial robes with feathers and ermine skins and brandished a rattle. Others seated about the room were beating on the floor with sticks to keep time to their chanting. The old fellow would dance around for awhile and then with a wild yell spring over to the cot and rattle vigorously over the patient. On March 25th of this year, at the same village up on the Skeena River, two Indians were convicted in police court of practising witchcraft. Sometimes the so-called doctor will suck the evil spirit from the person, or after sucking produce a stick, stone or other foreign body. These men had scooped a spirit from six different places of the patient's body with their cupped hands, and then raising their hands in the air, had blown the spirits away. The old patient assured the judge that the doctors had blown away the spirit of a bear, and both he and the doctors assured the court of their sincerity.

If business was slack, the Indian doctor did not hesitate to resort to tricks. I have here to-day, through the kindness of Dr. Wrinch, of Hazelton, and Rev. G. H. Raley, of Sardis, some "soul-traps." One of them is a piece of netting about three feet square, with a quarter-inch mesh, made entirely of cedar bark. Another is made of bone and another of wood, each very nicely carved from a piece of the material about six inches long and a quarter of an inch thick. The carving represents the wide-open mouths of double-headed wolves, one head facing each way. The medicine-man would pick out a person whom he thought a likely subject, and tell him that in a dream he had seen his soul flitting through the forest. As this was a death sentence unless the victim could get his soul back a bargain would be made, and the doctor would agree to try and catch it. Equipped with one of these traps and his reputation for supernatural power, he disappeared into the forest for a variable length of time. Meanwhile the victim would take to his bed or if already there would rapidly grow weaker. In due course the medicine-man reappeared with the soul and replacing it in the body with appropriate incantations, all would be well again.

One of our old Indians informed me that they used to have a basin of water ready for the medicine-man when he came. To show that he was not fooling them, he would wash his mouth out with this, and then remove his upper clothing to show that he had nothing concealed. Then with just his head-dress and necklace of dance beads he would dance, while his assistants drummed vigorously to help him work up his strong spirit or "tamanawas". Then, with a howl, he would put his mouth against the patient's body and suck with all his strength, several times if necessary. Occasionally when the evil spirit did come out, it would come suddenly and go right down his throat, and he would have to choke and splutter and cough till he got it up again. Then carefully ejecting it from his mouth into his cupped hands, he would hold it under water for a few minutes to drown it, roll it about between his hands, then with a strong puff, blow it away. This man also told me that when he was about ten years old, some sixty years ago, he was breaking a stick with his teeth when he swallowed a sliver. They took him to an old lady doctor who felt the back of his neck, sucked and blew on it. As she blew, she started to rub the front of his neck and finally with a flourish, produced a real sliver, and he felt better immediately.

The chiefs had more or less power over the medicine-men, and if they were jealous of any one they would get the medicine man to put the victim out of the way. The usual way of doing this was to bewitch him with an evil or "mesatchie box". These are very rare, and the one I show you now belongs to Rev. Mr. Raley. Their faith in the power of a person who can use one of these boxes is still very strong, and nothing causes more excitement around an Indian village than for a report to get out that someone has a mesatchie box. The usual procedure is to gather some things that have been in intimate contact with the person of the victim, such as hair combings, a handkerchief, spittle, a neck band from a shirt, etc., and to place the things in the box which is then hidden out in the woods. Word is passed around that a mesatchie box is out for a certain person. The report finally gets to the ears of the victim who is so frightened that he sickens, or, if ill, slips off very rapidly. Just this spring, a young man who has been in the hospital off and on with tuberculosis, for some years, contracted influenza and had a recrudescence of the tuberculous process, and failed rapidly. As I noticed that he was unusually despondent one day, I asked him the reason. He told me that his uncle had been in and advised him to sell his boat so that he could get the good of the money. There was no chance of his recovery for a mesatchie box had been put out for him. I investigated and could not get any corroboration, but, whether or no the chap soon slipped away.

Association Notes

THE SIXTY-FOURTH ANNUAL MEETING OF THE CANADIAN MEDICAL ASSOCIATION TO BE HELD IN SAINT JOHN, N.B., JUNE 19, 20, 21, 22, 23, 1933.

The March issue of the *Journal* carried the Preliminary Program for our sixty-fourth annual meeting. It is anticipated that the final program will be available for presentation in the May issue.

Members contemplating attending the meeting are advised to make reservations direct to the Admiral Beatty Hotel.

Golf

The annual Golf Tournament for the Ontario Cup will take place on Monday, Tuesday and Wednesday, June 19, 20 and 21. All members of the Canadian Medical Association are eligible to compete. Take your clubs along and enjoy the game on some of the beautiful links of Saint John.

Entertainment

Some communities have an aptitude for certain things. In this regard, New Brunswick is noted for the cordiality of its welcome and the sincerity of its hospitality. Those who attend the annual meeting at Saint John may rest assured that the quality of the entertainment which will be provided will be quite in keeping with the traditions of the City.

Note the dates:—June 19th, 20th, 21st, 22nd and 23rd, and plan for a real holiday in Saint John at that time.

Hospital Service Department Notes

Autopsy Without Consent

A point of interest to hospital workers was raised at a recent inquest in Toronto on an elderly patient who died in a mental institution and upon whom an autopsy was performed without the consent of the relatives. Owing to the failure of the relatives to notify the hospital of their changes of address, over a week elapsed before they knew of the patient's death, and, later, an inquest was ordered as a result of protests forwarded to the government. Two points were at issue:—whether or not the hospital authorities had made sufficient efforts to get in touch with the relatives, and whether or not they were justified in doing an autopsy without permission.

When it was found that the addresses on file were useless, the police were enlisted to find the relatives, but without avail. The opinion was expressed that the radio and other means of communication should have been utilized. This matter is of concern to every hospital, for difficulty in locating relatives is of very frequent occurrence. It takes considerable time, and that costs money, to keep admission records up-to-date and to locate relatives when necessary, and hospital workers will endorse the opinion of the jury that more definite responsibility in notifying the hospital of change of address should be assumed by the relatives. At the same time it was recommended that the hospital keep a simplified visitors' record in each ward, as

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, Secretary, 184 College Street, Toronto.

stipulated by the Ontario government, in order to have a record of the visitors' last addresses.

With respect to the autopsy, apparently the two medical staff members involved were unacquainted with the legal aspects of such examination. A corpse has definite rights in the eyes of the law, particularly with respect to disposal and those entitled to custody of the body have both rights and obligations. Except when an autopsy is ordered by the coroner or the Crown, it is illegal to perform an autopsy without the sanction of those entitled to the custody of the remains. Such individuals are usually the next of kin, although in the case of estrangement or separation, or if the nearest relative lives in a distant country and has not kept in close touch with the deceased, another relative, or, in some cases, a close friend may give consent. To warrant legal protection the hospital or the pathologist should be reasonably certain that the party giving consent can be considered the nearest relative. This consent should be in writing, and, if possible, be witnessed.

In summing up the case, the Chief Coroner pointed out that, while indignities to the remains constitute an offence under the Criminal Code, it has never been defined in the Code that performing an autopsy under proper conditions is an indignity to the remains. The Coroner's jury exonerated the hospital's medical staff, and found no negligence or contributory act by any official or persons at the time of death.

The Period of Liability for Hospitals Reduced in Ontario

Hospitals in Ontario will be pleased to note that, following representation by the Ontario Hospital Association, an amendment to the Hospital Act was passed at the last session of the Legislature whereby the period of liability was reduced from six years to two years. This was requested because of the handicap under which hospitals find themselves when they are called upon to defend a suit years after the discharge of the patient, when details have become hazy, and at a time when interns, pupil nurses and other vital witnesses have become widely scattered. In the Maritime Provinces and in British Columbia the six year period still prevails. The wording of the Ontario limitation of action revision in the Public Hospitals Act, 1931, is as follows:

> "40a. Any action against any hospital or any person for anything done or purporting to be done in pursuance of this Act brought by or on behalf of any person who has been admitted as a patient in such hospital and has been discharged therefrom shall be commenced within two years after his discharge."

Provincial Association Notes

THE FIFTY-THIRD ANNUAL MEETING OF THE ONTARIO MEDICAL ASSOCIATION
Hamilton, May 30, 31, June 1, 2, 1933

The March issue of the *Journal* presented a general outline for the next annual meeting of the Ontario Medical Association. Herewith is a list of speakers who have accepted invitations to be present, along with their subjects. In looking over these names, it will be observed that the Committee in charge is to be congratulated for having arranged a program of such a high order.

Dr. W. S. Barnhart, Ottawa—
"Arthritis."

Dr. N. E. Berry, Kingston—
Moving picture demonstration of pyelography and urological cases.

Dr. Wm. Bethune, Hamilton—
"Clinical case in gynæcology."

Dr. Grant Bird, Oshawa—
"Abdominal emergencies exclusive of appendicitis."

Dr. F. B. Bowman, Hamilton—
Clinical case.

Dr. J. F. Burgess, Montreal—
"Some aspects of psoriasis."

Dr. Louis H. Clerf, Philadelphia—
"Bronchoscopy in diagnosis."

Dr. J. G. Cunningham, Toronto—
"Silicosis."

Dr. W. J. Deadman, Hamilton—
"Neuro-blastomas of adrenals."

Dr. H. K. Detweiler, Toronto—
"Jaundice."

Dr. W. H. Dickson, Toronto—
"Thorotrast."

Dr. Dudley Irwin, Toronto—
"Experimental intravenous administration of thorium dioxide."

Dr. W. C. Doyle, Windsor—
"The mortality of acute appendicitis."

Dr. T. A. J. Duff, Toronto—
"Injection treatment of varicose veins and hæmorrhoids."

Dr. A. W. Farmer, Toronto—
"Treatment of cutaneous contractures."

Dr. Reginald Fitz, Boston—
"Indigestion."

Dr. F. J. R. Forster, Stratford—
"Case report of brain abscess."

Dr. G. S. Foulds, and Dr. J. B. Maxwell, Toronto—
"Clinical observations in kidney stone cases."

Dr. W. E. Gallie, Toronto—
"Fracture of the neck of the femur.'

Dr. A. Goldbloom, Montreal—
"Whooping cough."

Dr. Geo. C. Hale, London—
"Arteriosclerosis."

Dr. John Hepburn, Toronto—
"Common applications of the electrocardiograph."

Dr. W. P. Hogarth, Fort William—
"Treatment of complications of gonorrhœa in private practice."

Dr. Goldwin Howland, Toronto—
"The relations and inter-relations of the mind, the endocrine glands and the sympathetic nervous system, as observed in the neuroses and psychoneuroses."

Dr. E. C. Janes, Hamilton—
"Surgery in the treatment of chronic chest diseases."

Dr. Wm. Keith, Toronto—
"The occurrence, diagnosis and treatment of the abscesses arising in connection with chronic otitis media in children."

Dr. A. R. Lindsay, St. Catharines—
"Common pædiatric problems in general practice."

Dr. E. A. Linell, Toronto—
"The autonomic nervous system."

Dr. J. M. Livingston, Waterloo—
"Blood pressure, normal and abnormal."

Dr. H. D. Logan, Lindsay—
"The acute abdomen in general practice."

Dr. Wm. Magner, Toronto—
"Secondary anæmia."

Dr. Jas. Miller, Kingston—
"The action of tissue extracts upon malignant growths."

Dr. H. B. Moffatt, Ottawa—
"The diseased gall bladder."

Dr. J. H. Mullin, Hamilton—
"Post-operative tetany six years after removal of thyroid."

Dr. H. R. McAlister, Hamilton—
"Report of case of diabetic coma."

Dr. C. C. McCullough, Fort William—
"Sinus infection."

Dr. J. W. S. McCullough, Toronto—
"The doctor and the cancer patient."

Dr. G. F. McFadden, Strathroy—
"Surgery in the smaller hospital."

Dr. A. G. McGhie, Hamilton—
Clinical case.

Dr. C. D. Parfitt, Gravenhurst—
"Early diagnosis of tuberculous lesions."

Dr. John Parry and Dr. K. Murray, Hamilton—
"Seven cases of cholecystitis with pancreatitis."

Dr. H. E. Preston, Brockville—
"Problems in obstetrics."

Dr. F. I. Reid, Chatham—
"Spinal anæsthesia."

Dr. L. J. Rhea, Montreal—
"The lesions in the central nervous system and the bones in lead poisoning."

Dr. G. E. Richards, Toronto—
"The radiological treatment of cancer."

Dr. Geo. Shanks, Toronto—
"Medical experiences in the East."

Dr. E. H. Shannon, Toronto—
"Radiological investigation of the accessory nasal sinuses."

Dr. H. J. Shields, Toronto—
"Local anæsthesia in general practice."

Dr. W. J. Stevens, Ottawa—
"Indications for abdominal Cesarean Section and operation."

Dr. G. H. Stevenson, Whitby—
"Psychiatry in general practice."

Dr. F. F. Tisdall, Toronto—
"Dental caries, its production and prevention by dietary means."

Dr. E. J. Trow, Toronto—
"Skin lesions of the face and their treatment." (Lantern slide demonstration.)

Dr. G. K. Wharton, London—
"Histology and pathology of the pancreas."

Dr. A. B. Whytock, Niagara Falls—
"Carcinoma of uterine cervix."

Dr. J. J. Williams, Hamilton—
Clinical case.

Dr. H. M. Young, Iroquois Falls—
Clinical case.

Hotel Reservations

Herewith appended are the room rates for the Royal Connaught Hotel where all sessions of the convention will be held:—

Room without bath—single	$2.00 and $2.50
—double	$3.50 and $4.00
Room with bath—	$3.00, $3.50, and $4.00
—Tub and combination,	$3.00
Room with shower—	$2.50 and $3.00
Double room with bath (twins or double bed)—	$5.00, $6.00 and $7.00

The hotel has been greatly enlarged since we last met in Hamilton, and there is ample accommodation for all visitors. Please make your reservations direct to the Hotel.

Golfers, Fore!

All lovers of the game who contemplate attending the meeting will be delighted to note that arrangements have been made at the famous Ancaster Club for the annual Golf Competition for which the Hamilton Medical Society, four years ago, donated the beautiful Hamilton Academy of Medicine Trophy. The cup will be presented to the winner at the Friday luncheon.

Entertainment

Entertainment for both members and ladies is being very carefully worked out by the Committees in charge. Visitors may be assured of a very delightful time at the Hamilton meeting.

Medical Societies

The Calgary Medical Society

On December 6, 1932, at the regular monthly meeting of the Calgary Medical Society, Dr. Willis Merritt gave an address on "The problem of hypertension." He stated that hypertension is a secondary manifestation arising from some bodily disturbance and that it is not a disease. He emphasized the effect of physic influences on blood pressure, whereby this may be much increased by emotional disturbances. This was exemplified in young recruits during the late war. During sleep the blood pressure drops, but during dreams it may rise to 200 (systolic) in elderly people and may be a cause of hemiplegia. During the early years of life the elasticity of the blood vessels plays an important part in keeping the pressure at a normal level. The great blood

vessels dilate and by their contractility diffuse the blood. As the years advance there is diminished elasticity, so that when a man reaches the age of fifty the elasticity has so diminished that the left ventricle has to do more work. The diastolic is more important than the systolic pressure and is more ominous if it continues to rise.

Dr. Merritt referred to the familial tendency to arterial disease. In the investigation of the cause of hypertension habits of eating, mental strain and worry, as well as a tendency to infections and how the patient responds to such infections should be investigated. The functional kidney test should be followed up and investigated. With hyperpiesis or essential hypertension there is an increase in the hæmatogenous, cerebral and renal dysfunctions. No one of these is found singly so that there is a combination of more than one. In all cases of this type there is a vascular degeneration of the kidneys. The diastolic pressure rises to keep up the force of the vascular organs. A lowering of the systolic pressure is of bad omen. The prognosis depends on the height of the blood pressure. All such patients are in danger of a cerebral accident as well as renal insufficiency and heart failure. Of great importance in the treatment is giving encouragement to the patient, who should not be treated as an invalid. He should be kept active by modified work. If overfat he should be placed on a restricted diet, but not to the point of becoming weakened. He should have nine to ten hours' rest each night. Depressant drugs have no place in the treatment of this condition. All focal infections should be cleared up.

Dr. F. C. Clarke opened the discussion and spoke about the juvenile type of hypertension and that found in association with uterine fibromyomata.

On January 3, 1933, the members of the Calgary Medical Society listened to a comprehensive address given by Dr. D. S. McNab on "The practical application of recent advances in our knowledge of the biliary system."

G. E. LEARMONTH.

The Edmonton Academy of Medicine

The monthly meeting of the Edmonton Academy of Medicine, held on January 4th, was devoted to a discussion of the clinical and pathological features of infective mononucleosis and agranulocytic angina.

Dr. J. W. Scott described the clinical aspects of these interesting blood diseases. He pointed out the diagnostic difficulties from clinical findings alone in infective mononucleosis. Agranulocytic angina is a rare, and, if untreated, usually a rapidly fatal disease. The speaker called attention to the recent striking results reported in the use of nucleic acid preparations in this condition.

Dr. J. J. Ower discussed the various phases of blood development in the normal person, as contrasted with that found in the diseases under discussion. He stressed the importance of hæmatological investigation in infective mononucleosis as a means of differentiation from acute lymphatic leukæmia. Dr. Ower raised the interesting and very controversial point as to whether the lesions of a granulocytic angina were always preceded by a leukopenia. One case in which such findings occurred was described.

Dr. D. B. Leitch presented the clinical and laboratory data on two cases of infective mononucleosis in children which he had recently seen. He pointed out that the disease was probably more common than was realized, and might give rise to serious diagnostic errors. particularly in the sporadic cases. The fact that children after recovery from the acute phase of the disease often required a prolonged period of convalescence, with adequate diet and iron medication for the accompanying secondary anæmia, was emphasized.

The meeting was well attended and the papers presented gave rise to an active discussion in which Drs. McGuigan, Scanlon and Wright took part.

H. C. JAMIESON.

The Montreal Physiological Society

At a meeting of the Montreal Physiological Society held on February 20th, at McGill University, the following subjects were discussed.

THE RELATION BETWEEN THE SEMICIRCULAR CANALS AND THE UTRICLES IN THE FROG

By W. J. McNally

The semicircular canals respond to any sudden tipping movement about a horizontal axis by causing a movement of the head in the opposite direction to the tipping. The utricles, on the other hand, in the absence of the semicircular canals, respond both to slow and to quick tilt. When they respond to quick tipping the head movement is in the opposite sense to that resulting from canal stimulation.

In the normal frog the canals and utricles may be stimulated simultaneously, the canal effect predominating, so that the resulting compensatory movement is in the opposite direction to the tipping. The utricles exert a checking influence upon the canals, helping to make the responses prompt, definite and precise,—characteristics so striking in the normal labyrinthine compensatory reactions of the frog.

The observations and experiments have all been carried out in conjunction with Professor John Tait, of the Dept. of Physiology, McGill University.

OBSERVATIONS ON ADRENALIN GLYCÆMIA

The Function of the Vagus Nerve in Blood Sugar Regulation

By S. Dworkin and A. L. von Wahl
(by invitation)

The purpose of these experiments was to determine the function of the vagus nerve in the normal

insulin response to intravenous injections of adrenalin and glucose.

Adrenalin and glucose were injected intravenously in a large number of well-controlled normal rabbits, and on the basis of these experiments intravenous doses of adrenalin of 0.02 mgrm. per kilo were selected for the following experiments. The rabbits received 0.02 mgrm. per kilo of adrenalin intravenously and standardized doses of glucose, likewise intravenously, before and after section of the vagus, and in some cases after atropine.

We can say that vagal section in these experiments caused no variation in the response which could not be reasonably explained on the basis of individual variation.

THE INFLUENCE OF INORGANIC AND ORGANIC ACIDS ON THE MOTILITY OF THE SMALL INTESTINE

By N. M. Gray

This paper was a preliminary report and dealt with the influence on intestinal motility of inorganic and organic acids introduced into the lumen of the gut.

The work was done on the denervated jejunum of healthy cats and the filling method of recording intestinal movements was used. Solutions of hydrochloric, acetic and lactic acids, isotonic with blood, were used. Two series of experiments were done, one in which the acids all had the same pH (pH 2.5), and a second in which they all had an equal titratable acidity (0.15 per cent HCl). It was shown that organic acids caused increased tone and motility in comparison with HCl. In further experiments, in which physostigmine was given in subminimal doses, this effect was emphasized.

The Regina and District Medical Society

A committee appointed by the Regina and District Medical Society to consider medical economic questions brought in the following report:—

The purpose of the city health department is for preventive medicine only.

An out-patient department should be established at the Regina General Hospital in charge of a physician, and the clinicians should be appointed by the medical staff.

Indigent patients on relief, who are able to walk should attend these clinics for treatment instead of coming to the physician's office.

A social service department, with headquarters at the Regina General Hospital should be established; this department to include a doctor, a nurse, an investigator, and a clerical staff.

A consultative Board of two, appointed by Dr. Coles, M.O.H., should be appointed, this Board to be regularly rotated. Its purpose is to consult in contentious cases, whose physicians feel that they should be admitted to hospital but who the medical health officer feels do not require hospital treatment. A five dollar fee is to be allowed for each consultation.

A call to an indigent patient on relief in a Home should be paid for by the city at the usual fee for the first call and part of the usual fee for the subsequent calls.

Payment to doctors treating indigent cases in the hospital should be as follows: uncomplicated medical cases, nothing serious, or acute medical cases and operations, a percentage of the usual fee. That maternity cases be paid for in the home at a percentage of the usual fee; in the hospital nothing for a normal case, and a percentage of the usual fee for a complicated case.

The Saskatoon and District Medical Society

At the annual meeting of the Saskatoon and District Medical Society the following officers were elected for 1933. *President*, Dr. G. T. MacKay; *Vice-President*, Dr. W. M. Oliver; *Secretary-Treasurer*, Dr. Anna Nicholson; *Executive Council*, Drs. A. E. Ross, W. H. McConnell, and A. L. Lynch. *Representative* on the executive of Saskatchewan Medical Association, Dr. J. A. Valens.

Special Correspondence

The Edinburgh Letter

(From our own correspondent)

The death of Sir J. Arthur Thomson, Emeritus Professor of Natural History in the University of Aberdeen, is deeply regretted in Scotland. A son of the manse, he was born in East Lothian in 1861. His works on Natural History have made his name a household word throughout the English-speaking world. He was educated at Edinburgh University and his early intention was to enter the ministry. The influence of his teachers, however, led him to take up the study of natural science. He studied for a time under Ernst Haeckel in Vienna. In 1886 the University of Edinburgh recognized him as an extra-mural teacher in Zoology, and in 1899 he was appointed Regius Professor of Natural History in the University of Aberdeen. Modest and retiring in disposition, he was a man greatly beloved by all who had the privilege of knowing him. He had a world-wide reputation as a lecturer, for he had the happy facility of presenting the results of his scientific researches in simple and clear language which appealed to the ordinary listener, and in

this way he did a great deal to promote a widespread interest in the natural sciences. He was also a prolific writer. Amongst his best known works are the "Evolution of Sex," the "Wonder of Life" and the "Outlines of Zoology." Sir Arthur received many academic distinctions. He was an LL.D of McGill University and also of the Universities of Aberdeen and Edinburgh. He received the honour of knighthood in 1930. Three of his sons are members of the medical profession; one of them, Dr. David Thomson, is Assistant Professor of Bio-chemistry in McGill University.

That deserving section of the population, the lower middle class, is one that should have more adequate medical provision made for it, especially in so far as institutional treatment is concerned. These people, under the present economic circumstances, are in many cases not receiving the medical attention that they really require. They may hesitate before sending for their family doctor in an endeavour to avoid any unnecessary expense. For the same reason they avoid, if at all possible, a consultation with a specialist, whilst should a major surgical operation be necessary, the amount involved in professional fees and nursing home expenses is all too frequently a serious financial embarrassment. Opinion is gradually growing to the effect that an adequate medical service should be provided by means of some system of voluntary insurance. This, however, cannot materialize for some time to come. In the meantime the Directors of the Victoria Infirmary, Glasgow, have taken a step in the right direction by setting up a paying-patients' department. At the annual statutory meeting of the Infirmary held recently, the Lord Provost of Glasgow presided and referred to the popularity of the paying-patients' department, which he described as one of the best of the later developments of their public institutions. He said how gladly he welcomed the action of the Directors in forming a department of that description. He thought they were undoubtedly providing a service that was of the utmost value to the community. There was a certain class who did not want to accept charitable treatment and who were able to pay something, but who were not able to pay the fees of a nursing home. In this new department they were receiving accommodation and treatment at a cost well within their means. He observed that the Directors were considering an extension of the department, and he was perfectly certain that when this was completed the people of the City and the West of Scotland would heartily support the enterprise.

The subject of maternal mortality and morbidity is at the present time engaging the serious attention of the Department of Health, the medical profession, and various interested public bodies in Scotland. As I stated in my January letter a voluntary inquiry into maternal morbidity covering all births in Scotland over a period of six months has recently been inaugurated. In this connection a Conference, promoted by the Edinburgh Branch of the National Council of Women and the Edinburgh Women Citizens Association, was recently held in the Scottish House of the British Medical Association. Mrs. Chalmers Watson, M.D., presided. Addresses were given by Dr. James Young, President of the Edinburgh Obstetrical Society and by Lady Cynthia Colville. Dr. Young stated that each year in Great Britain about 4,000 women died and 70,000 were damaged in the process of childbirth. This unfortunate state of affairs was not due to any lack of knowledge regarding the medical and obstetric conditions that endangered women. It was due to the inadequate application of that knowledge. He pointed out that where women were adequately cared for the risk of maternity was very small. He quoted the figures of a maternity hospital in the east-end of London where the mortality was only 1.3 per 1,000 as compared with the general rate for England of 3.3. per 1,000. In another hospital 21,500 women had been attended with the very low mortality rate of 0.8 per 1,000. These results were due to the care which was taken of the women during pregnancy. He was of opinion that there were two main reasons for the large incidence of mortality and morbidity that was still existent. First that most of the women in the community were attended by midwives and doctors engaged in independent practice, and there was need for their fuller training in ante-natal care; secondly, that the local authorities had not sufficiently realized the need for linking up their ante-natal clinics with midwives, doctors and hospitals, and much expensive effort had consequently been wasted. There was need for improved education of the midwives and the medical student, and for co-ordination in administration.

The annual Kate Kennedy pageant of St. Andrew's University was held on February 27. Kate Kennedy was the niece of Bishop Kennedy who founded St. Salvator's College and Chapel and was beloved by the students of that day. In this pageant the part of Kate is taken by a first-year student—"a beardless bejant." The choice of the student on whom the honour is conferred is made in secret conclave immediately prior to the commencement of the proceedings. The characters in the pageant are led by "Saint Andrew" robed in blue and bearing a large white St. Andrew's Cross. "Mary Queen of Scots" mounted on a palfrey is an outstanding figure, as also are "Sir William Wallace," "King Robert the Bruce" carrying his battle-axe, "King Charles II," and "Archbishop Sharpe" in his old-world coach. Kate's carriage comes in at the rear of the procession preceded by a mounted herald. She visits the Principal of the University, is given a civic reception, and the procession finishes at the romantic setting of the Old Castle.

R. W. CRAIG.

Edinburgh.

The London Letter

(From our own correspondent)

Influenza has visited these shores once again, and as there are now signs of the epidemic abating it is possible to discuss the problem with a better sense of perspective than a month ago when we were in the thick of it. The phrase "visited these shores" is used with deliberation, since one theory has been to the effect that the virus came to us across the Atlantic, and certainly early outbreaks were reported from seaport towns. London did not really begin to get its share until a week or so after the mortality rate had begun to jump up for the midlands. On the whole it was a milder type of disease than that which occurred in the later phases of the 1918-19 pandemic. Many questions are raised by this malady, and naturally enough the ever-ready lay critics of the profession have been busy raising them in all corners of the popular press. There was a recurrence of the theory that influenza is really a form of "foot-and-mouth disease," since an outbreak of this occurred among the cattle of certain areas about the same time. Also on veterinary lines has been the suggestion that since distemper among dogs has now been so successfully conquered by organized research surely "influenza" which is "something like distemper" could be attacked in the same way, if money were made available. The difficulty here is, of course, that distemper research proceeded apace because dogs could be used for crucial experiments and human volunteers rather than money would be the pressing need of similar research work on the human infection. In this connection it is reported that the authorities at St. Bartholomew's Hospital would like to get hold of human sufferers in the early stages for obtaining more exact information on the "virus" in the nose and throat and this might lead to "human research." Another popular view, which has received some support in the columns of a medical journal, is to the effect that the lowering of morale among the people at large is mainly responsible for the epidemic and supporters of this view point to the post-war conditions in 1918-19 as compared with the present slump and general terrible conditions among the workers in many areas. There is some food for thought in most of these theories, but research into this great problem has been proceeding and will proceed until a solution is found without any need for the many pin-pricks of the past few weeks.

Another infectious disease awaiting more research is whooping-cough which has been widespread in the past month or two. A recently published statistical study of this disease in certain London boroughs has led Dr. Percy Stocks to conclude that whooping-cough must be regarded as the most expensive epidemic disease among children—that is, when the cost is measured in terms of loss of life, acuteness of physical suffering, permanent damage to respiratory, cardiac or nervous mechanism, and loss of school attendance. Now actually one of the major causes of death in early childhood, whooping-cough is still under-rated in importance by both lay and medical minds, probably because last century the mortality from diphtheria and scarlet fever quite overshadowed that from pertussis. Adequate control of the two former has left whooping-cough untouched, to rise relatively in the mortality scale. Under school-age the dangers appear to be specially serious and Dr. Stocks questions the advisability of excluding contacts from school, since he thinks that such potential sufferers very likely spread the disease among their younger friends, and he urges the importance of trying to postpone the disorder by isolation of all cases as far as possible away from young children. All sorts of other interesting problems are raised by this study, as, for example, why girls suffer much more than boys, and why in crowded areas the attack-rate appears to be lower than in better housed parts of London. Statistics are apt to be dry, but those here mentioned are bristling with practical value and suggest that this "Cinderella" of the infectious fevers should receive much more attention in the future.

As mentioned in the letter appearing in the February issue, reforms of medical education are in the air and the British Medical Association has now set up a committee to consider certain aspects of the matter. This has been considered necessary in order to secure the views of general practitioners, and it is hoped to have a report ready for discussion at the annual representative meeting in July. Another important development as regards medical education in London has been the announcement of an arrangement whereby the various large general hospitals now under the London County Council will be linked up with the medical schools of the voluntary teaching hospitals. Precise details have yet to be worked out between the deans of the various schools and the Council's authorities, but meanwhile it must be emphasized that the value to the students of the clinical material collected in the municipal hospitals can scarcely be over-rated and the introduction of systematic teaching into the routine of these hospitals will be a source of stimulation to the staff and indirectly a benefit to the patients. More than this, the arrangement marks an important step in the co-ordination of voluntary and official hospital services which may have great developments in the future.

ALAN MONCRIEFF

London.

Topics of Current Interest

The New Canadian Formulary

The publication of the new Canadian Formulary is imminent, and we would like, therefore, to draw the attention of the members of the C. Ph. A. to some of the salient features of the book.

It is the product of a joint Committee of Members of the Canadian Medical and Pharmaceutical Associations and a representative, Mr. Lancaster, of the Department of Pensions and National Health, Ottawa. This committee is known as the Canadian Committee on Pharmaceutical Standards.

The Chairman of the Committee is Dr. V. E. Henderson, Professor of Pharmacology, University of Toronto, who, with Dr. G. H. W. Lucas, Associate Professor of Pharmacology, and Professor R. O. Hurst, of the Ontario College of Pharmacy, has been actively engaged in editing the book.

Now that the material is all shaped up and the C. F. is ready for publication, a glance through the typewritten pages reveals the care and assiduity that have been exercised in its compilation and great praise is due the editors for their work.

The book is divided into three sections, *viz.*, a Formulary Section, an Addendum Section and a Reference Companion. It also contains a table of doses of the more commonly used drugs for domestic animals.

Formulary Section.—This section of the Formulary contains a selection of formulas intended to meet many of the needs of the practising physician; or would form the basal Pharmacopœia for a hospital. It is, of course, by no means exhaustive. The formulas are intended for extemporaneous dispensing. An endeavour has been made to make those intended for internal administration as pleasing and as palatable as the essential constituents permit. They have all been experimentally tested from this point of view. The other formulas have all been tested from the point of view of extemporaneous dispensing and can be recommended to physicians and pharmacists. This section is intended to be official so that a physician prescribing by the Latin title should receive the ingredients called for in their proper proportions. The letters C. F. are an integral part of the title and must be employed if the physician expects to receive the ingredients as set forth in the Formulary.

The Addendum.—This section is designed to serve as an Addendum to the British Pharmacopœia 1932 and expected to be mandatory and official in Canada.

In this section are included the monographs for:—

(a) Such drugs as have been deleted from the British Pharmacopœia 1932, but which are still, in the opinion of the Canadian Committee on Pharmaceutical Standards, worthy of retention.

(b) Such drugs as have been retained from the previous edition of the Canadian Formulary and are recommended by the Committee for use by physicians and pharmacists. These have been studied by the Committee and in some cases modified. Some of the formulæ of the previous edition are found in Section I and in the Reference Companion.

(c) Certain drugs or preparations not recently official in the British Pharmacopœia, are entirely new and required as ingredients in Sections I and II.

and (d) Certain modifications of British Pharmacopœial formulæ which have seemed to be more in accord with the common usage in Canada.

The Reference Companion.—In this section of the book are contained for reference purposes such preparations as are frequently called for under the name of their originator, such as Benedict's Solution, Boulton's Solution, Burow's Solution, Calot's Solution, Fuller's Lotion, Gibert's Syrup, Mandl's Pigment, etc., or under some common English name. This section is not intended to be official but to serve merely as a source of reference for pharmacists and physicians.

The Committee decided that the size of the book was to be four and a quarter inches by six and three-quarter inches — a convenient pocket size. It is to be bound in brown fabrikoid with rounded corners and the title stamped in black ink.—*Canad. Phar. J.*, 1933, **66**: 308.

Carbon Monoxide in City Streets

It is found that the air in busy city streets contains a measurable quantity of CO, averaging 0.8 parts per 10,000 in 14 towns of the U.S.A., about 0.5 in the street air in Chicago, and ranging from this to about 0.15 in suburban districts. Samples taken by Mr. Regan in central London, during the winter, gave 0.3 parts per 10,000. The concentration in the open street thus rarely approaches the danger limit, but it must not be forgotten that although a dangerous concentration may be rare, it does not follow that it never occurs.

In all cases of atmospheric pollution we have been accustomed to rely upon the scavenging action of the wind to clear away the impurities. This is the case with the smoke from our chimneys, grit and fumes from factories, as well as the fumes and poisonous gases permitted to escape from the exhausts of motor vehicles. Now it is true that there is usually some wind to

carry these away; also that a concentration of vehicles at any particular place may not occur at the moment when the wind has failed. Again, we have the possibility of abnormalities in the vertical temperature gradient preventing the upward escape of fumes, but what we perhaps do not realize is that all the conditions favouring high concentration may some time occur together.

For example, a long street of high buildings may be crowded with motor vehicles owing to some hold-up of the traffic. This may happen on a day when the wind has fallen and when the temperature gradient overhead does not encourage the upward escape of hot gases. In such circumstances it appears possible that the concentration of poisonous gases might become sufficiently high to be dangerous. It was coincidence of certain conditions which brought about the accident in the Liberty tunnels.

The affinity of hæmoglobin for carbon monoxide is 300 times as great as for oxygen. Hence, in the presence of any particular concentration, the CO will be seized in preference to the oxygen, and the effect will be to produce a condition of the blood in which a definite saturation value of CO will be reached. It would seem, therefore, that however long the exposure to air containing carbon monoxide, the degree of saturation of the blood can never exceed a certain value corresponding to the concentration in the air. This does not, however, preclude the possibility that low concentrations of CO may be injurious when breathed for long periods.

Reference has been made to the use of heavy oil engines such as Diesel engines, and although these have not yet come into general use, there is a general tendency in that direction, and it is interesting to note that the exhaust from such heavy oil engines usually contains a very small proportion of carbon monoxide under normal running conditions, certainly much lower than that produced from petrol engines.—*The Lancet*, 1933, **1**: 155.

The Prevention of Cancer

Dr. Joseph C. Bloodgood, Professor of Surgery at Johns Hopkins University, recently addressed the Ottawa Medical Society on cancer and its prevention. He has within the past few years interested himself and many others in an intensive study of this very prevalent disease, and lets no opportunity go by for bringing to the notice of the medical profession and the general public the outstanding facts about cancer and what may be done to prevent it. Early diagnosis is the most imperative requirement at the present time. Dr. Bloodgood said that when the majority of people adopt voluntarily the idea of periodic health examinations, cancer of the skin, mouth, breasts and cervix uteri will be relegated to the category of preventable diseases. Periodic examination and preventive medicine are like a new religion, and the majority of people must be reached just as they have been reached in the past by new religions. He blamed "so-called personal liberty" for the difficulty science encountered in persuading people to accept the truths of preventive medicine.

In connection with Dr. Bloodgood's talk it is interesting to note that in 1900 cancer was tenth on the list of the causes of death with a rate of 64 deaths per 100,000 population. In 1910 it had moved up to eighth position with a mortality rate of 83. In 1920 it had moved up to fourth place with a mortality rate of 99, and in 1929 it was in second place with a mortality rate of 117 deaths per 100,000 population.

For the year 1931 the Metropolitan Life Insurance Company reported an unprecedented increase of 7.4 per cent in the mortality from cancer among its policyholders. This year, up to the end of September, there was a further increase of 9.6 per cent. "Instead of the persistent but slow rise experienced for years, we now have this sharp acceleration, with the probability that by the end of 1932 we shall find the cancer mortality-rate to have increased three-quarters as much in two years as it did in all the preceding twelve years back to 1919."

At the recent convention in St. Louis of the foremost surgeons in the country it was stated that cancer was a curable disease if the disease was discovered in its early stages. It was pointed out by these eminent authorities that the way to discover cancer in its early stages is by a thorough physical examination. Cancer rarely causes any pain in the beginning, gains headway when undiscovered and unchecked. One of the eminent authorities present at this convention advised his hearers to urge their patients to have a complete physical examination every six months.—*How to Live*, 1932, **15**: 7.

A Health Record for 1932

The fact that there is no "iron law of mortality" is beginning to be appreciated. Only a quarter of a century ago the average death rate in the United States approximated 18 per thousand of the population, a figure not widely different from that of many European countries. The urban mortality was invariably larger than that of rural areas. The year 1932, however, set a record for low mortality in our largest metropolis, New York, with its variegated population of nearly seven and one-fourth million persons. According to the annual report of the commissioner of health, 1927 had previously been the most healthful year. In 1927 the gen-

eral death rate from all causes was 10.71 per thousand of population and the infant death rate 56 per thousand births. In 1931 the respective rates were 10.92 and 55.6. During the year just closed the general death rate was only 10.3 per thousand of population and the infant mortality rate was 50.9 per thousand births.

The chief causes of death are of perennial interest. In the order of their numerical importance they were chronic heart disease (with its toll of about 19,000 persons), cancer, pneumonia, accidents, pulmonary tuberculosis, Bright's disease and diabetes, with a residual heterogeneous mortality of 26,000 from "other causes" out of a total of 74,000. The deaths from pneumonia and tuberculosis were measureably fewer than in the preceding year. A distinct improvement in the death rate from diseases of the heart, arteries and kidneys is reported among persons under 65 years of age. It can no longer be alleged with truth that the saving of life is confined to the period of infancy.

It has been said that much illness is preventable and that public health is purchasable. Many persons are more readily impressed by the showing in dollars and cents than by humanitarian sentiments with respect to the value of our modern public health activities. Preventive medicine is often charged with being overloaded with costly "frills." Accordingly the economic aspects of the health situation in New York may be of more than passing interest. At the present time the annual expenditure of the department of health for all its manifold activities is less than 70 cents per capita, a sum lower than that expended by other large cities of the world. The New York report asserts that, in this metropolitan city during the five years 1921-1925, the general death rate averaged 11.42 per thousand of population. Had this rate prevailed during 1932, 8,000 more deaths would have occurred. At the valuation of $10,000 for each life, the economic saving as a result of the low death rate attained has been about $80,000,000. Compared with the annual budget of the department of health, about $5,000,000, this is a handsome return.—*J. Am. M. Ass.*, 1933, **100**: 261.

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It appeared that Roy Oakes had gone to Dr. J. Homfray Roderick, Ancaster, and arranged to have his appendix removed. Dr. Stevenson had been called upon to perform the operation.

Dr. Stevenson said that Roy Oakes had had a private room at the hospital and his father had paid for that. He admitted not having seen the father before the operation was performed. He had rendered a bill to Roy Oakes and had had no reply, so he sent a bill of $100, including Dr. Roderick's bill of $36, to the father.

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ment, the witness admitted, Roy Oakes had said to him that the family wished him to have the operation and he (the doctor) knew that Roy had no occupation except working for his father. After the argument as to who should pay had arisen, Roy had said that if he hadn't understood his father would pay he would not have had the operation, the witness declared.

Roy Oakes denied stating that his father would pay for the operation, and declared that he had intended paying for it from the proceeds of the sale of a motorcycle. "I figured I should pay for it; I was over age," he said. He had paid $3 on account of the bill. At first bills had been tendered to him, but later they were sent to his father.

Leslie Gay, counsel for the defense, invoked the statute of frauds, which makes a written contract necessary in such cases, but as he had not pleaded this statute, he was not allowed to rely upon it.

Harold A. F. Boyde, plaintiff's counsel, contended that there had been an understanding given by Roy Oakes that the father would be responsible.

X-rays in the Case of Possible Fracture

An important decision has been handed down by the Court of Appeal in British Columbia in the case of Moore vs. Large. This decision was relied on by the Saskatchewan Court of Appeal in a recent case.

With reference to Moore vs. Large, this was a case in the Supreme Court of British Columbia, in which it was held that the failure of a surgeon to have an x-ray examination made, or at least to recommend its advisability, which examination would in all probability have disclosed the fact that the patient's shoulder was dislocated and not, as the surgeon diagnosed it, a mere strain, constituted a lack of reasonable care which rendered him liable in damages. The doctor in this case, the trial being before a Judge without a jury, had damages of $2,347.50 and costs awarded against him. This case was appealed and has been argued before the British Columbia Court of Appeal. The Court of Appeal held that in a case where a joint has been injured and dislocation is suspected the fact that the surgeon who is consulted and who applies the recognized tests and gives the usual instructions does not advise the taking of an x-ray examination, does not necessarily constitute negligence on his part, even though it is subsequently disclosed as a result of such examination that his diagnosis was erroneous.

This case was recently relied upon in a hearing before the Saskatchewan Court of Appeal, in the case of Armstrong vs. Dawson, which was an action by a father and son for damages against a physician for alleged negligence in treating the son. The son's arm had been broken and the plaintiffs contended that the defendant was negligent in using the fluoroscopic method of taking x-rays with the machine at his disposal instead of taking x-ray films or pictures. The plaintiffs were given judgment against the doctor for comparatively small damages, from which the defendant appealed successfully to the Court of Appeal, which dismissed the action with costs.—*Bull. Man. Med. Ass.*, 1933, **13**: 404.

Abstracts from Current Literature

Medicine

The Etiology and Treatment of Chronic Arthritis. Burbank, R., *J. Am. M. Ass.*, 1932, **99**: 1489.

By the use of a special technique, the author and his co-workers were able to obtain positive blood cultures in from 4 to 8 per cent of their afebrile arthritic patients. They believe that the septicæmia is transitory and occurs with the lowering of some barrier of resistance. The organisms found were streptococci of low virulence, and corresponded to those found in the stools of 90 per cent of their patients with arthritis. The injection of these streptococci into rabbits invariably produced a low-grade rheumatoid joint involvement, similar in type, duration, and pathology to the rheumatoid findings in human beings. These arthritic joints were cultured in bouillon and sectioned after staining, when it was possible to demonstrate the actual streptococci in practically all lesions, deep in the tissues. The hæmatological distribution of the streptococci was traceable to the terminal blood vessels, and most of the pathological changes could be traced directly or indirectly to changes in the capillary circulation.

In the treatment of chronic arthritis, active primary foci that could give a hæmatogenous distribution of the bacteria must be found and removed. To be of material value, this must be done before secondary foci become established in the intestinal tract and in the joints themselves. When it is impossible to remove infective foci, the author recommends the use of an autogenous and complement-fixing vaccine to raise the general resistance of the patient. Systemic reactions are to be avoided, the best results being obtained with small doses. A chronic nasopharyngitis is mentioned as one of the most active and least easily eradicated sources of secondary intestinal infection. An emulsion of previously digested bacteria may be used as a spray of the nose and throat, to raise the resistance of the tissues locally. The

author discusses measures to be employed against the intestinal infection and cautions against increasing the permeability of the intestinal mucosa by drastic catharsis and the use of irritating foods. Every means should be employed to maintain the physical condition of the patient at as high a level as possible, and to improve the terminal circulation. The importance of orthopædic measures in the correction of deformities and posture is stressed. Increased pain in the joints after exercise or massage is to be avoided. Thyroid is recommended in those cases with a lowered basal metabolism. Diet need be restricted only as regards sweets, irritating foods, and those digested with difficulty.

H. GODFREY BIRD

Osteitis Deformans. O'Reilly, T. J. and Race, J., *Quart. J. Med.*, 1932, **1**: 471.

The literature of this disease is fully discussed and 30 cases are presented by the authors. The incidence is greater than is commonly supposed. The disease is usually noted after 40, showing itself by physical signs, by symptoms, or by neither. The course and duration varies greatly, but the disease is essentially slow. Clinically, there are thickening, bending and elongation of the bones, with or without pain, the pelvis, skull, long bones and skull being most frequently affected in this order; the bones may be involved separately or in combination. The pain is believed to be due to strain placed on the other supporting tissues due to the bony deformities. Headaches and cranial nerve palsies are noted, the latter being distinctly rare. There are no constant complications, but the association with osteo-sarcoma is high.

Radiographically, a "cotton wool" appearance has been described as typical. The authors note an early stage of decalcification, when the structure of the bone appears "simplified". Typically, in the skull, a stage may be noted when the normal sharp outlines are lost, and the appearance becomes hazy and like ground glass. Then amorphous calcium salts may be deposited throughout the bone "in a white steamy cloud," obliterating all radiographic detail. The pathology is essentially an almost complete removal of the original osseous tissue and its replacement by new bone on a different plan and in a larger mould, the change being effected by highly vascularized young connective tissue. The authors feel that the disease is a local condition affecting the reticular cells of the bone. This (Paget's) disease certainly has no relationship to osteitis fibrosis cystica and nothing to do with changes in the parathyroids. It appears to be closely associated with the reticulo-endothelioses.

The blood shows always a normal serum calcium and phosphorus content, but a high blood phosphatase. This enzyme itself does not appear to initiate calcification, but represents an active recalcifying process when its content is high. A relative monocytosis with no absolute increase in white blood cells was found.

The authors have used arsenical treatment in a few cases and have produced changes in the blood chemistry towards the normal, with clinical improvement in at least one case. They feel that this drug deserves further trial.

W. FORD CONNELL

Clinical Applications of the Recent Work on Bone Disease. Mellanby, E., *Brit. M. J.*, 1932, **2**: 865.

In the normal animal the structure of bone is the result of a struggle between two influences—one tending to perfect formation and calcification, the other hindering calcification. The factors assisting calcification are (1) adequate calcium and phosphorus, and (2) adequate vitamin D, either in the food or as synthesized in the body by exposure to the sun or other source of ultra-violet radiation. Milk, cheese, butter, egg yolk, and meat and fish fat all assist calcification, while cereals actually hinder. Lean meats, vegetable fats, etc., are also bad. All circumstances in England—climatic, dietetic and economic—are conducive to defective bone formation. Rickets, late rickets and osteomalacia are largely the effects, at different ages, of a poor calcifying diet. In England there is very much active rickets still, and most children have passed through stages of defective bone formation, reflected in the imperfect development of their teeth. Increased milk consumption is advisable. The best source of vitamin D, cod liver oil, also contains valuable amounts of vitamin A and iodine. Cereals should not be given below 8 months and might well be curtailed later. Calcium phosphate may be given to rachitic children as well as cod liver oil. Osteomalacia is similarly cured; minor degrees are probably not uncommon in England, especially in pregnant women. Sufficient minerals and vitamins should be given the pregnant woman to supply the needs of the embryo, without depleting her own stores. There is a slight danger of hypervitaminosis from too-concentrated preparations of vitamin D. The dose should not exceed 5,000 units daily. Cod liver oil is safer for marasmic children.

Generalized osteitis fibrosis cystica (Von Recklinghausen's disease) and its relationship to parathyroid abnormality is discussed. The high blood calcium and phosphatase, the low phosphorus, and the high urinary calcium and phosphorus of this condition are not seen in localized osteitis fibrosis cystica. Treatment of the generalized disease is by removal of the

parathyroids, either by surgical or x-ray treatment. The tetany which follows is temporary and can be cured by parathyroid extract. The cause of Paget's disease (osteitis deformans) is still unknown. The writer treats his cases with a high-calcifying diet. The only chemical abnormality is the high blood phosphatase. Renal rickets is due to functional derangement of the kidney and related to the inability of the latter to excrete phosphorus. The kidneys are in some way related to the parathyroids. Their relation to calcium metabolism requires further investigation. W. FORD CONNELL

Cancer and Heredity. Cholewa, J., *Zeitschr. f. Krebsforschung*, 1932, **37**: 215.

Cholewa reports the history of two families in whom there were a number of cancer cases, and, moreover, cases in which cancer tended to affect the same organ of the body in different members. The first family was one in which the mother had died of uterine cancer, and the father of gastric carcinoma. They had 8 children, two of whom died too young to have shown the cancerous tendency, if they had it. Of the remaining six, 4 had died of carcinoma. The eldest daughter succumbed to uterine carcinoma at the age of 55; the second daughter died of the same disease at 60; and the fifth daughter died of it at 45. The third and fourth daughters are alive at the ages of 72 and 65, respectively. The one son who lived into the cancer age died at 50 of carcinoma of the stomach. It will be noted that the daughters had the same type of tumour as had the mother, and the son suffered from cancer of the stomach like the father.

The second family is more striking in that it covers three generations, and should certainly give the opponents of the idea that cancer is inherited food for thought. In the first generation there were two sisters, Mrs. A and Mrs. B. Mrs. A, dying of carcinoma of the uterus, had a daughter who died of the same disease. Mrs. B in the first generation died at 70 of cancer of both breasts. She had a family of 12 children of whom 3 died below the average cancer age. One died at 23, one at 21, and one committed suicide at 35. Of the remaining 9, there were 4 who were living and who had not shown cancer so far. One woman was well at 77; her sister was alive at 75, with diabetes, but no sign of cancer; one was living at 62; while the fourth had suffered from a stroke at 60. Of the remaining five children, almost 50 per cent of the family of this cancerous mother, one had cancer of the breast at 49; another, cancer of the uterus at 59; a third, cancer of the ovary at 45; a fourth had died of uterine carcinoma at 65; and the fifth had also died of uterine carcinoma at the age of 45.

The third generation was represented by 3 children, each a child of a cancerous mother of the second generation. Thus the mother with breast cancer at 49 had a daughter who died of breast cancer at 48. The one who had uterine cancer at 59 had a daughter who died of uterine cancer at 49. The mother, who died of ovarian cancer at 45, had a son who died of rectal carcinoma at 45.

Two records like this certainly argue very strongly in favour of the idea that cancer has as one of its most potent etiological factors the constitutional make-up of the individual, in other words, heredity.

MADGE THURLOW MACKLIN

Surgery

Endothelioma of the Dura (Meningioma). Davis, G. G. and Voris, H. C., *Arch. Surg.*, 1932 **25**: 84.

The authors use the term endothelioma in preference to meningioma of the dura "on account of the physical relationship of these tumours to the dura, and to conform to ordinary clinical usage in referring to these tumours." They report a case of this type of tumour originating from the dura, which eroded the bone without any evidence of bony proliferation, and closely resembling, microscopically, a malignant tumour. In a review of the literature, Davis and Voris have been able to find mention of only 3 cases in which there was definite destruction of the overlying bone. Their patient was a man of 54 who complained of numbness of the right extremities of three months' duration, weakness of the right extremities for a period of one month, a sensation of fullness in the head for weeks, and an epileptiform attack two days before admission to hospital. He gave the history of direct injury to the vertex of his head three months previously. Since the injury his right arm and leg felt numb. There was a swelling in the left fronto-parietal region, the size of an English walnut, which the patient said had been present from an injury in childhood thirty-five years previously. This was firmly fixed to the skull and slightly tender. His gait was slightly spastic with a tendency to circumduction of the right lower extremity. Muscle power was good in all of the extremities. Roentgen examination showed a defect near the midline of the skull midway between the lamdoid and coronal sutures. There was no evidence of associated bony proliferation. At operation a tumour about the size of a plum and of firm consistency was found adherent to the dura, which extended through the eroded area of the skull. This tumour was removed. The pathological report stated that it was a squamous-cell carcinoma. The patient made a good recovery from the

operation, but thirteen days later there was a definite weakness of right extremities, a typical right hemiplegic gait and a right foot-drop. There was a sustained ankle-clonus on the right side, with a positive Babinski sign. He occasionally had an epileptiform seizure which involved the right extremities. About five months later he left the hospital in about the same condition as on admission and with the hemiplegia slightly improved. The pathological diagnosis was questioned, as the tumour had existed for 35 years and there was a failure to discover any primary carcinomatous focus and the patient remained in good physical condition. Re-examination of the specimen with different methods of staining, proved that the growth was an atypical endothelioma (meningioma) of the dura, with slight evidence of low-grade malignancy.

G. E. LEARMONTH

Acute Pancreatitis. McWhorter, G. I., *Arch. Surg.*, 1932, **25**: 958.

Sixty-four cases of acute pancreatitis are reported, based on all the available records of patients with this highly fatal condition who had been treated by members of the Chicago Surgical Society. Direct or indirect infection may be a factor, induced most commonly by the colon bacillus, the pneumococcus and the staphylococcus. Acute pancreatitis may occur without infection yet it may develop rapidly in the presence of bacteria from the normal gland or from an increased permeability of the bowel wall in the vicinity. The non-infectious origin includes mechanical, traumatic, chemical, enzymatic or degenerative factors. Archibald believes that there are three factors involved, which are a change in the composition of the bile, an undue resistance, perhaps spasm of the common duct sphincter, and an abnormal rise of pressure in the gall bladder or the bile ducts producing a reflux of bile into the pancreas. In 55 per cent of the cases some type of cholecystitis or cholelithiasis was present. What the cause of death is in acute pancreatitis has not been definitely established.

In McWhorter's series there were 35 deaths, a mortality rate of 54 per cent. Six patients not operated upon died. Among predisposing factors the highest mortality rate or 85 per cent was that of obese patients, and 90 per cent for those with a history of alcoholism, 64 per cent of the emaciated and 60 per cent of those with a history of typhoid fever. The four chief operative procedures were (1) simple drainage of the peritoneal cavity, (2) drainage of the pancreas or of an abscess, (3) drainage of the gall bladder, which occasionally included the common duct, and (4) drainage of the gall bladder, together with drainage of the pancreas or its capsule. G. E. LEARMONTH

Salivary Calculi. Ivy, R. H. and Curtis, L., *Ann. Surg.*, 1932, **96**: 979.

The most significant work on the etiological factors of salivary calculi is that of Soderlund and Naeslund who found actinomyces in all cases examined. Saphrophytic, as well as the Wolff-Israel pathogenic, strains were found. Seventy-three cases are reported by the authors: 66 occurred in submaxillary gland or duct; 7 in the parotid. The condition was observed more frequently in males, and on the left side. Calculi were commonest in the 3rd decade: 44 of these calculi were demonstrated radiologically, 22 clinically.

Cases with submaxillary calculi with obstruction manifest an acute or a subacute swelling, circumscribed, tender, not adherent to skin, pain and painful enlargement at meal times. There is no limitation to opening the mouth. The duration of symptoms varied from a few days to 17 days. During an acute attack the duct orifice is reddened and pus may be extruded. Fever and leucocytosis are usually present in the acute attacks. Parotid calculi result in a similar train of symptoms. These calculi are much more difficult to demonstrate radiologically.

The treatment is primarily the removal of the calculus. If it is in the anterior two-thirds of the duct this can be accomplished under a local anæsthetic through the mouth. In non-suppurative cases the mucous membrane is sutured without drainage. If infection is present a small wick of gauze is left in the incision. Should the calculus be movable in the duct a suture is used to compress the duct behind the stone and so prevent it slipping away from the operator. Calculi near the gland are best removed through the neck. Incision should be well below the mandible, and in long-standing cases the gland should be removed as well.

STUART GORDON

Obstetrics and Gynæcology

The Value of Cæsarean Section in Pre-Eclamptic Toxæmia. Basden, M. M., *Brit. M. J.*, 1933, **1**: 58.

Thirty cases of pre-eclamptic toxæmia treated by Cæsarean section with no maternal deaths and no subsequent development of eclampsia are recorded. In the author's experience the high mortality which has been shown to follow Cæsarean section when eclampsia has actually supervened does not occur when the operation is performed in the pre-eclamptic stage. Cæsarean section for toxæmia does not condemn the patient to delivery by this method in subsequent pregnancies. The writer's usual practice in severe cases is to keep the patient on water only, or water, glucose and lemonade

for twenty-four hours. If at the end of that time there is only a slight improvement labour is induced, while if the condition is the same, or worse, Cæsarean section is performed. The risk of operative procedure in this condition has been over-estimated. Further, the child is more likely to die as the result of prolonged toxæmia in the mother than from prematurity.

ROSS MITCHELL

The Complications of Radium Therapy in Gynæcology. Ward, G. G., *Am. J. Obst. & Gyn.*, 1933, **25**: 1.

Safety in the use of radium depends on the careful study of the location and extent of the disease, of the type of cell and the degree of its maturity, of the general physical state of the patient as to age, blood condition and toxæmia, of the careful pre-operative preparation of the patient, of the amount of radium used and its distribution in appropriate containers, on the proper employment of screening to cut out the burnings rays, on the placing and maintaining of the radium *in situ* where it will destroy the cancer and yet not damage adjacent viscera, on the duration of the application, and the time and dosage of reradiations and deep x-ray therapy, and, finally, on a careful frequent follow-up.

Complications of radium therapy are: secondary hæmorrhage, which may require prompt packing; vesical and rectal irritability, as a result of the failure to distend the vagina to the utmost with gauze packing and to insert a self-retaining catheter in the bladder when the radium is in place; vesico-vaginal fistula, especially where a previous supravaginal hysterectomy has been done and cancer has developed in the cervical stump; recto-vaginal fistula; partial or complete occlusion of the cervical canal, which may lead to pyometra; radium burns in normal tissue from displacement of the radium; contraction of connective-tissue formation in the broad ligaments, which may produce obstruction of the ureter and involvement of the kidney and severe deep-seated pelvic pain; phlebitis of the leg; permanent amenorrhœa in young women where an overdose of radium has been given.

ROSS MITCHELL

Subacute Bacterial Endocarditis as a Complication of Pregnancy. Mengert, W. F., *Am. J. Obst. & Gyn.*, 1933, **25**: 121.

Two cases are reported. From the study of the literature and of these two cases the author concludes that the condition does not seem to affect the course of pregnancy, labour and the puerperium materially. Pregnancy complicated by subacute bacterial endocarditis should be allowed to proceed to normal conclusion, because the mother is almost certain to die and it is doubtful if the sacrifice of the child contributes, even in the smallest way, to her chance of survival. In labour plentiful first stage analgesia, followed by delivery in the most conservative manner after full dilatation of the cervix, is the obstetric treatment of choice. Cæsarean section is justified only in the interest of the baby when the mother is *in extremis*. The babies do well if they are not too premature at birth.

ROSS MITCHELL

Urology

A Technical Consideration of Endoscopic Revision of the Obstructing Prostate. McCarthy, J. F., *J. Urol.*, 1932, **28**: 519.

The highly technical nature of endoscopic revision is emphasized, and it is pointed out at the outset that it is to be employed only by urologists who are qualified in endo-urethral methods and whose ability is such as to permit of judicious discrimination in case selection, to make prompt decision, and to carry out the necessary intervention in the complications which must from time to time arise. Further, the urologist should, until thoroughly experienced, confine himself to the simplest types of cases.

It is the writer's opinion that this procedure should be limited to the correction of prostatic fibroses, small and moderate middle lobes, and moderate-sized combined middle and lateral lobes. Those who bleed readily and who do not tolerate instrumental examination well should be evaluated with great care, and those with very large spongy prostates, or prostates which from their angular conformation inhibit free movement of the instrument, should be reserved for primary cystotomy with later revision or prostatectomy.

In the majority of cases the writer has employed urethral drainage for decompression. He believes that the use of a very small catheter adds greatly to the comfort of the patient and drainage is accomplished in this way in patients who could not otherwise tolerate it.

For the most part caudal and paravertebral anæsthesia supplemented with urethral instillations is employed. If spinal anæsthesia is employed it is necessary that an observer be on the alert to inform the operator when the bladder is full, as a rapid flow of irrigating fluid is required and hyperdistension might easily occur.

The idea is to produce a canalization of the urethra from the internal sphincter to a point immediately posterior to the verumontanum, to exaggerate the normal tubular character of the deep urethra. The middle lobe is first approached, because of the observation that when this is cleared lateral lobes frequently enter the picture, where prior to such removal they were not noticeable, and for the additional considera-

tion that if there should occur any reason for not completing the operation it may be terminated with resultant relief, Routinely, the lateral lobes are then completed.

Post-operatively, a No. 24 whistle-tip soft rubber catheter is employed for drainage, which must under no circumstances be interrupted. If a clean smooth cut is made there is less likely to be bleeding than when a ragged cut is made. A hæmostatic bag has been devised for cases in which the bleeding cannot be otherwise controlled. Occasionally it has been necessary to reintroduce the 'scope, visualize a bleeding point and coagulate it. In this connection caution must be exercised not to coagulate too deeply or too much tissue in the neighbourhood of the bleeder, since such tissue must slough eventually, and in a tissue so absorptive as the deep urethra this may have serious results.

Infection is a remote but serious menace, and every precaution should be taken, as in an open operation. Secondary revisions should never be attempted until urethral convalescence is complete.

The author believes that the procedure is a logical one. It permits of visualization, excision and hæmostasis, and is a method which will stand the acid test of time.

N. E. BERRY

Ophthalmology

Tularæmia. Some Pathological and Clinical Manifestations with a Report of Two Cases. Klien-Moncreiff, B. and Rhodes, G. B., *Arch. Ophth.*, 1932, **8**: 245.

The authors report tularæmia occurring in two brothers, with ocular lesions in one.

L. C., a coloured boy of 17 years, presented himself at the clinic because of pain and redness of the left eye, with swelling of the lids and a tender swelling in front of the left ear of about two days' duration. The patient attributed the ocular inflammation to an injury, but on questioning as to any contact with rabbits or other animals he recalled that eight days earlier he had assisted his brother in skinning and dressing 300 wild rabbits. There were marked swelling and redness of the lids of the left eye, and marked injection of the palpebral and bulbar conjunctiva. There were numerous sharply defined yellowish nodules, from 2 to 3 mm. in diameter, in both the upper and lower tarsal and transitional folds of the conjunctiva. There was also in each of the upper and lower palpebral conjunctivæ a 3 x 5 mm. ulcerated area, the floor of which was coated with yellow necrotic material. There were two yellowish nodules in the bulbar conjunctiva, 3 and 4 mm. respectively from the temporal limbus, and another one nasally near the semilunar fold. There was no secretion in the conjunctival sac. The cornea, iris, media, and fundus were normal.

In only 3 of the 36 cases so far reported of the oculo-glandular type of tularæmia were there lesions of the bulbar conjunctiva. Corneal lesions have been reported in three instances. Subcutaneous nodular lesions simulating those of sporotrichosis which follow the lymphatic vessels from the primary lesion to the regional glands have been described. A case of the oculo-glandular type of tularæmia, with corneal involvement, is added to the 3 hitherto reported cases. From the focal lesion in an ulcero-glandular case, cultures were isolated through a guinea pig at the end of the third week. The eruption of nodular efflorescences during the fourth and fifth week of the illness in both cases is compared with similar manifestations in allergic conditions.

S. HANFORD MCKEE

A Case of Oculo-glandular Tularæmia with Bilateral Optic Neuritis, Resulting in Complete Blindness. Doyle, G. F., *Kentucky M. J.*, 1932, **5**: 137.

The author believes this to be the first reported case of oculo-glandular tularæmia in which there was involvement of the optic nerve. The case is that of a woman, aged 61 years, who cut her finger while dressing a rabbit which had been accidentally killed by an automobile. Before washing her hands she had occasion to rub her eyes. The day after she had a severe chill and fever which lasted for four days and part of the time she was delirious. On the sixth day a deep ulcer developed on the wound and the axillary, cervical, preauricular, and submandibular glands became swollen and tender. Simultaneously with the appearance of the ulcer on the finger the left eye became inflamed and very painful, with a profuse purulent discharge. The vision became markedly impaired. The next day the right eye was involved in a similar manner. The vision became progressively worse until she became totally blind eight weeks later. The ophthalmoscopic picture was that of papill-œdema which was beginning to pass into the stage of atrophy. Complete atrophy resulted.

S. HANFORD MCKEE

A Discussion of the Etiology of Trachoma with Special Reference to Bacterium Granulosis. Noguchi, *Bull. Ophth. Soc. of Egypt*, 1931, **24**: 36.

A detailed account of the most recent developments regarding the etiology of trachoma is given by the author. (1) Regarding a filterable virus as the causative agent in trachoma, experimental results are conflicting, and radically different opinions are held. (2) The view that inclusion-bodies represent living parasites is not

supported by recent investigations. Recent investigations show that inclusion-bodies can be induced in experimental animals by innoculation of the conjunctiva with various organisms and with chemicals. (3) The publication of Noguchi's work regarding *Bacterium granulosis* in 1926 stimulated a revival of interest in the problem of trachoma. Many American workers have published confirmatory reports on Noguchi's findings, but the evidence from other countries is not reassuring. The results of the author's work with *Bacterium granulosis* are to date inconclusive, and he believes that we shall never arrive at any determinate conclusions so long as we confine our experiments to animals, because no animal shows typical trachoma. The problem of the etiology of trachoma will only be settled as the result of human experiment. (From the *Am. J. Ophth.*, July, 1930).

S. HANFORD MCKEE

Neurology and Psychiatry

Disorders of the Sympathetic Nervous System and their Response to Medical and Surgical Treatment. Bramwell, E., *Brit. M. J.*, 1932, **2**: 823.

A brief historical review of neurology and the autonomic nervous system is given. It is probable that increasing knowledge of the reactions and disorders of the latter will profoundly modify existing conceptions of disease. In the anatomical summary, brief reference is made to sympathetic governing centres in the hypothalamic grey matter and of parasympathetic governing centres in the same neighbourhood. The writer inclines to the much-questioned view that skeletal muscle may be directly innervated by the sympathetic as well as by the somatic nervous system.

The autonomic system is exclusively concerned with internal economy, the sympathetic being katabolic and the parasympathetic anabolic. The latter is concerned with the normal function of the organs supplied and also exhibits an inhibiting effect on the sympathetic, which has as its chief function that of a defense mechanism for emergencies. The thyroid, pituitary and suprarenal are all under sympathetic control, while the parasympathetic and pancreas are closely associated. Animals can survive complete bilateral sympathectomy and show no abnormality, if not exposed to cold or fatigue (Cannon). Animals may also survive double vagal section.

As regards the action of drugs, adrenalin is a sympathetic stimulant, while ergotoxine paralyses its motor fibres; pilocarpine, physostigmine and choline stimulate the parasympathetic, while atropine paralyses it. It is suggested that the fact that belladonna is helpful in Parkinsonism possibly justifies some conclusions as to the nature of the rigidity.

Achalasia of the cardia is the only malady so far shown on pathological evidence to be due to sympathetic disease. The writer in 1925 advanced the view that muscular dystrophies might be due to a sympathetic abiotrophy. He now suggests that the rare cases of dystrophy which recover may be examples of a sympathetic polyneuritis.

After an enumeration of the many diseases ascribed, on purely clinical grounds, to sympathetic disturbance, the writer notes the good results following sympathectomy, chiefly in Raynaud's disease, thrombo-angiitis obliterans and megalocolon. The surgeon is warned, in conclusion, to attach due weight to the mental factor in the production of symptoms and to see that he is not carried away by his enthusiasm for the niceties of technical procedure.

W. FORD CONNELL

The Treatment of Trigeminal Neuralgia by the Cerebellar Route. Dandy, W. E., *Ann. Surg.*, 1932, **96**: 787.

Operation for the relief of trigeminal neuralgia is performed exclusively by the cerebellar route at the author's clinic. Two hundred and fifty cases have been treated in this manner. In the last 150 cases there has been no death either at operation or during stay in hospital, and there have been no post-operative complications. Several technical improvements in the operative procedure have been introduced since the original report on this method in 1929. Avertin anæsthesia has been substituted for ether; with this agent there is perfectly smooth breathing, and no swelling of the cerebellum. The electrocautery is now used to coagulate and divide the petrosal vein. It has only been necessary to divide this vein in about 1 in 15 cases. Suction applied indirectly on a pledget of cotton is used to evacute fluid in the lateral cistern. Division of the sensory root is performed with a blunt hook or by pinching the nerve with long, narrow forceps. The dura is always closed over the entire defect, thus preventing any possibility of laceration of the cerebellum during post-operative vomiting. Division of the posterior half of the sensory root will cure the pain in any branch of the nerve, and with practically no loss of sensation. Dandy thinks that the fibres which are responsible for this unique pain are collected from all branches of the trigeminal nerve into the posterior part of the sensory root.

The strongest argument for this method of approach is that in 18 of the 250 cases there have been disclosed hitherto unsuspected tumours in the posterior cranial fossa, and most of these could be removed at the same operation. In the discussion of this paper, however,

C. H. Frazier maintained that the temporal route in the hands of the majority of surgeons is safer, and guarantees permanent relief: 720 operations for trigeminal neuralgia by the temporal approach have been performed at Frazier's clinic with a mortality of 0.2 per cent.

FRANK A. TURNBULL

Therapeutics

Ketogenic Diet in the Treatment of Urinary Infections of Childhood. Helmholtz, H. F., *J. Am. M. Ass.*, 1932, **19**: 1305.

The benefit derived from this diet in urinary infections is due not to the increased acidity but to the definitely bactericidal properties of "Ketonurine," independent of its pH. Technique and experiments are given proving this point. Diacetic acid was also proved not to be a factor in the destruction of bacteria. Some other element is responsible. Applied clinically, for each kilogram of body weight, 1 grm. of protein, 2 1/3 grm. of carbohydrate and 4 grm. of fat are the diet requirements for the first day. The carbohydrate is rapidly decreased and the fat increased to make up the calories necessary (50 per kilogram); 1 to 3 grm. ammonium chloride may be given. Results are obtained in 5 to 10 days. Three cases are reported of several years' standing in which this regimen produced rapid disappearance of the pus from the urine along with general improvement. These cases had anatomical defects producing hydronephrosis in all three cases.

P. M. MACDONNELL

The Treatment of Pernicious Anæmia by Marmite. Goodall, A., *The Lancet*, 1932, **2**: 781.

Three types of pernicious anæmia cases were treated by "Marmite" (a vegetable concentrate of vitamins B.)—maintenance cases in whom satisfactory blood levels had been reached by the use of liver; primary cases, previously untreated; and one case of relapse from a satisfactory condition under liver therapy. A total of 19 cases are quoted. Maintenance dosage of a teaspoonful, thrice daily, proved satisfactory. Primary and relapsed cases received half-ounce doses (by mouth) thrice daily. A sharp and satisfactory reticulocyte crisis followed marmite treatment in all cases. Compared with other remedies the author would put liver, liver extract orally, stomach preparations, and marmite on the same level of efficacy. Severe cases require intravenous liver extract or even blood transfusion at first. Marmite appears to differ from liver in that it causes a preponderance of hæmoglobin production over corpuscle output. Important questions arising from these observations are indicated.

J. B. ROSS

Intensive Vitamin Therapy in Measles. Ellison, J. B., *Brit. M. J.*, 1932, **2**: 708.

Three hundred cases of measles were fed very liberal supplies of vitamins A and D, and compared with 300 cases fed an ordinary normal diet, with no added liver oils (except in convalescence). To the first group the equivalent of 1 ounce of cod liver oil (300 units of vitamin A and 2,000 international units of vitamin D) was given daily for 7 days in mild and 21 days in severe cases. There was no lessening of otological or cutaneous complications, but the pulmonary complications were definitely less severe in the high-vitamin group. The mortality in this group was 11 as compared with 23 in the control series.

W. FORD CONNELL

Mercury Poisoning. Peters, J. P., Eisenman, A. J. and Kydd, D. M., *Am. J. M. Sc.*, 1933, **185**: 149.

The authors believe that heretofore too much emphasis has been placed on the treatment of mercury poisoning by eliminative measures. They feel that it is more reasonable to direct the treatment towards correction of the functional disturbances such as shock and depletion of the body electrolytes. This can be accomplished readily by means of intravenous glucose salines and by transfusion. Their method of dealing with a case of mercury poisoning, when the drug is taken by mouth, is as follows. (a) Protein in the form of milk or egg-white is administered by mouth followed by gastric lavage. (b) A large intravenous infusion of saline is given as soon as possible, followed by blood transfusion if evidences of shock appear. (c) Subsequent intravenous glucose salines or transfusions are given at regular intervals thereafter, their frequency and amount depending upon the quantity of body fluids lost through diarrhœa or vomiting. (d) No fluids are given by mouth if there is vomiting. Rectal treatments are likewise omitted unless there is much diarrhœa. Cleansing enemata are found to be helpful if there is much diarrhœa. The authors believe that this form of treatment is applicable to poisoning by phenol and phosphorus.

E. S. MILLS

Hygiene and Public Health

The Incidence and Time-distribution of Common Colds in several groups kept under continuous observation. Frost, W. H. and Gover, M., *Pub. Health Rep.*, 1932, **47**: 1815.

Since 1923 the United States Public Health Service has been studying the incidence of minor respiratory affections in groups of university students, college professors and their families. The present report, which is the third to have been made of this study, deals principally with

the seasonal incidence of these conditions. Data are given and charts shown to indicate week by week the incidence of respiratory diseases in various cities in the United States. Boston, Chicago, Columbus, Washington, Berkeley, and New Orleans were the cities whence the factual material was derived. The attack-rates averaged three attacks per person per year, and no consistent variation could be laid to the influence of latitude, longitude, or climate. In all the cities minimum attack-rates were observed in the latter half of July or the first half of August. During the season of high prevalence, from September to March, the incidence curve in each locality exhibited a series of oscillations constituting a succession of epidemics, each of several weeks' duration. The highest incidence of common colds occurred in the autumn, while that for influenza occurred in the winter and spring.

FRANK G. PEDLEY

The Pneumonia Problem in the Steel Industry. Brundage, D. K. and Bloomfield, J. J., *J. Indust. Hygiene*, 1932, **14**: 345.

Several studies have indicated a high pneumonia incidence among workers in the steel industry. According to the records of the United States Public Health Service the annual incidence of pneumonia among iron and steel workers is 4.4 per 1,000 men exposed, compared with about 2.7 per 1,000 in other occupational groups. This figure, if applied to the whole working population of the iron and steel industry, would indicate an annual number of pneumonia cases of about 1900 and an excess incidence of about 685 cases. Assuming that the effective cause of this excess morbidity is the industrial environment, evidently this problem is one of major importance from the standpoint of industrial hygiene. A very complete study was made of the working conditions of the industry, and a careful statistical analysis of the experience during 5 years (1924-1928). Consideration was given to such factors as economic status, age, nationality, and addiction to alcohol, but none of these things was found sufficient to influence the pneumonia rate significantly. An analysis of the different jobs in the industry indicated that the disease was associated especially with exposure to wide changes of temperature and also inclement weather conditions. The men in certain cases were found to be exposed to intense heat at times and shortly after were chilled. Many men made a practice of walking home in cold weather in clothing saturated with sweat.

A number of suggestions are made regarding possible improvements in practice.

FRANK G. PEDLEY

Pathology and Experimental Medicine

The Prevention of Poliomyelitis. Flexner, S., *Brit. M. J.*, 1933, **1**: 132.

This disease is now generally accepted to be an upper respiratory infection of quite common incidence, slight cases presenting themselves as minor illnesses only. Flexner and Lewis have shown that even the slightest infection will protect monkeys against a second inoculation of the virus. While the blood of normal monkeys had no effect on the virus, it was shown that the virus was rendered innocuous by mixing it with the blood of recovered monkeys. Monkey convalescent is less potent than human convalescent serum, but can be rendered more effectual by injection of the virus into recovered monkeys.

In vivo experiments have shown that monkeys can successfully withstand even intracerebral virus inoculation, if given serum intrathecally within 18 to 24 hours of the virus injection; the serum is ineffective if given after the onset of symptoms. In the human being the virus is believed to both enter and leave the nervous system via the nasal mucous membrane; serum was shown to be even more effective when the virus was inoculated intrathecally; moreover, the effective time interval between infection and serum inoculation is longer. Intravenous serum is at times effective.

In human beings, it is generally agreed that serum is no good once paralysis has appeared; as regards its efficacy, given early, medical opinion is still divided. In man, there appears to be an inherently effective agency at work in aborting poliomyelitis, since the human disease is less fatal and there are many more abortive cases seen than in monkeys, where no such agency is operative. Yet it is certainly true that in monkeys, early serum injection can abort the infection. It is generally agreed that the serum injection can do no harm; it cannot be affirmed that in individual cases it does no good. Hence its use in early cases would appear to be justified, until a better method of prevention is known.

Passive serum prevention is experimentally possible, the blocking effect against the entrance of the virus into the nerve cells enduring apparently for several days after intraspinal inoculation. Hence, Stewart and Flexner advocated convalescent serum injections in young persons as a protective measure during epidemics. This was done in several thousand children in the 1931 New York epidemic and the case incidence was thought to be lower than in the general population. It has long been known that the blood of practically all adults usually possesses considerable antiviral properties, sometimes more than the blood of a convalescent young individual; this is assumed

to be due to a widespread subclinical infection of the adult population. For this reason, 30 c.c. of unclotted parental blood was given intramuscularly in the New York series of cases. In the 1932 Pennsylvania epidemic, this method was again used, with apparently favourable results, though the final data have not been analysed. While all injected cases cannot be expected to escape infection entirely, enough has already been achieved to warrant a further and wider trial of this safe and readily available means of preventing poliomyelitis.

Important work is at present being done on active immunization of monkeys, using subcutaneous or intracutaneous injections of virus. This method is not free of danger; the combined use of virus and serum would seem to offer greater security. It has recently been shown, too, that the passage of human virus through a number of monkeys decreases its virulence, without apparently altering its immunizing properties. Further study may allow of the application of such facts to the securing of active immunity in human beings.

W. FORD CONNELL

Cutaneous Reactions in Acute Rheumatism. Collis, W. R. F., Sheldon, W. and Hill, N. G., *Quart. J. of Med.*, 1932, **1**: 511.

The authors have reviewed the literature covering skin reactions of rheumatic children to streptococcal products. They tested the skin reactions of 303 rheumatic and 256 non-rheumatic children to the soluble extract of the ground-up bodies of hæmolytic streptococci, and found the former much more sensitive than the latter group, while of the rheumatic children those with chorea were the most sensitive. Patients with fulminating carditis failed to react, and those with chronic heart failure gave reduced reactions. In this investigation, in which small amounts of well-diluted extract were used and the criteria of a strongly positive reaction were severe, about one-quarter of the rheumatic children failed to react, while slightly more than one-quarter of the non-rheumatic controls gave a positive reaction. The percentage of positive reactors amongst the non-rheumatic group was found to increase up to the age of puberty. Over 80 per cent of the rheumatic children gave a strongly positive reaction when tested within 6 months, while only 40 per cent were positive when tested over a year after the last acute attack.

The reaction to the hæmolytic streptococcal extracts was found to bear no relation to reaction with hæmolytic streptococcal exotoxin (Dick toxin). Other streptococcal extracts each gave a specific skin reaction of their own, rheumatic children showing a higher percentage of positives than the controls. When other organisms, such as pneumococci, staphylococci, diphtheroid bacilli and Pfeiffer's bacillus, were used to make extracts, these gave no higher percentage of reactors amongst the rheumatic than amongst any other group of cases. These results, then, appear definitely to support the hypothesis that hæmolytic streptococci play an integral part in the etiology of acute rheumatic fever.

W. FORD CONNELL

Obituaries

Dr. Peter E. Brown, of Ste. Anne de Bellevue, Que., died on February 28, 1933. He was ninety-six years of age, and the oldest graduate in medicine of McGill University.

Dr. Brown was born in England in May, 1837, and when three years old came to Canada with his parents who crossed the Atlantic in a three-months-long voyage which finally brought them to Quebec City. Dr. Brown's father, a farmer, wished to settle at Ottawa, and the little family made its way up the river to the Ottawa Valley, but when near Hudson found the countryside so beautiful that it was not worth going further. There they settled.

Young Peter Brown went to school in the Montreal College and subsequently entered McGill University, where he graduated in medicine in 1863.

He practised for a few years in Knowlton, Que., and then returned to Montreal for a few years more. But he was not long active in the medical profession and about 1873 moved to Ste. Anne de Bellevue, where he had resided ever since.

He was active during the great small-pox epidemic in Montreal in 1885, and will be remembered as one of the leaders in the great educational campaign which finally persuaded most people on the Island of Montreal to be vaccinated against that virulent disease. At that time there was rabid opposition to vaccination among many classes, and Dr. Brown wrote many articles which were published in newspapers.

Dr. Brown's great hobby was sailing, and his skill in charge of a yacht was well known on the river. He is survived by three sons, J. H. P. Brown, James Lewis Brown, and Fred A. Brown, of Toronto; and two daughters, Mrs. Pascal Deslauriers, with whom he lived, and Mrs. E. Kent. His wife, the former Miss Maria Rafter, of Montreal, died thirteen years ago.

Dr. James A. Campbell. In failing health for several months, Dr. James A. Campbell, a leading medical practitioner of St. Thomas, Ont., for twenty years, died on February 23, 1933. He was born in 1884 and was a graduate of the University of Western Ontario (1912).

Dr. George Brunt Carbert, of Campbellville, Ont., died on February 23, 1933, in his sixty-seventh year. He was a graduate of Trinity University (1888). He is survived by his wife, formerly Miss Jessie S. McPhail.

Dr. Robert P. Crookshank, a pioneer of Rapid City, died at his residence in Brandon, Man., on February 2, 1933. He was born at St. John, N.B., in 1851 and graduated in 1878 from Columbia University. His post-graduate work was done at Guy's Hospital, London. Returning to Canada, he became medical superintendent of the mental hospital at St. John, and assistant superintendent of the General Hospital in the same city. In 1884 he came west and settled at Rapid City. It

is stated that he is the fortieth on the roll of the College of Physicians and Surgeons of Manitoba. He was a 32nd degree Mason and Past Master of Corinthian Lodge, Rapid City, on which he wrote a history. He is survived by his wife, two sons and a daughter, residing in Brandon.

Dr. Arthur Guy Ashton Fletcher, of Toronto, died on March 1, 1933, at his home, after a lengthy illness. He was the son of the late Ashton Fletcher, K.C., of Woodstock. Born in that city in 1870, Dr. Fletcher came to Toronto as a young man and attended Trinity Medical College, graduating in 1894. He started practice in Toronto about 1896 and specialized in obstetrics. In 1897 Dr. Fletcher married Eleanor Beatrice Forbes, of Chicopee Falls, Mass., and had one son by this marriage. He later married Laura King, of Toronto, and had one daughter.

At the outbreak of the war Dr. Fletcher joined the 12th York Rangers as a lieutenant, later transferring to the 10th Devons of the British Army, where he served as a captain. In 1917 he was placed in charge of a hospital in Salonika as a major in the R.A.M.C.

He returned to Toronto and became attached to the Western Hospital as a general practitioner, and was also a medical examiner for the Independent Order of Foresters. He is survived by his widow; his son, Gordon, and his daughter, Margaret.

Dr. J. T. Arthur Gauthier, of Valleyfield, Que., President of the Medical Association of Beauharnois district, and President of Valleyfield School Commission during the past ten years, died at his residence on February 5, 1933. He was 66 years of age.

Dr. Gauthier was born in the village of Varennes in 1866, the son of Theodule Gauthier and Adelaide Girard. He completed his classical studies at the College of Montreal and Ste. Therèse Seminary, and his medical studies at the Laval University (1894). He commenced his medical practice in Valleyfield over forty years ago. For twenty-six years he was physician of the Montreal Cottons, Limited, at Valleyfield, and during the past twenty years physician of the Metropolitan Life Insurance Company.

He is survived by his wife, formerly Elizabeth Monnette, and three daughters (Alice), Mrs. R. Dionne; (Blanche), Mrs. R. Belanger; and Miss Jeanne Gauthier, all of Valleyfield.

Dr. William Carter Heggie, of Toronto, died at his home on February 20, 1933. He was for two decades head of the out-patients' department of the Western Hospital, and for thirty-five years one of the best-known doctors in the west end of the city. Dr. Heggie was born in Brampton 66 years ago, the son of the late Dr. and Mrs. David Heggie. He was educated at Brampton High School and the University of Toronto, where he graduated in medicine in 1886. He then went to Detroit, becoming assistant to Dr. Donald McLean there. Later, he moved to Malton, where he lived some years, and then, after a further sojourn in Detroit, settled in Toronto in 1898. Keenly interested in athletics, he was at one time a member of Brampton Lacrosse and Football Clubs; his hobbies were boating and fishing. He is survived by his widow, formerly Miss Gertrude E. MacAffree, of Newport; and one son, Robert L. Heggie.

Dr. Charles Jacob Wesley Karn, of London, Ont. Dr. Charles J. W. Karn, formerly of Woodstock, Picton and Kitchener, died at his home in London on February 27, 1933, after a long illness. He was born at Woodstock, Ont., 70 years ago. He graduated in medicine at Trinity University, Toronto (1888), and began to practice in Woodstock. He moved to London twenty years ago and retired from practice five years ago. He is survived by his widow and one daughter.

Dr. Eugene LaRue, died in the month of January at St. Flavien, Que. He was 73 years old. He was born in Quebec in 1859, graduated in medicine from the University of Laval in Quebec in 1883, and practised first in St. Croix and then at St. Flavien.

Dr. Daniel Alexander McClenahan, of Hamilton, Ont., Provincial Medical Officer of Health of the Hamilton district for the past twenty years, died suddenly on March 4, 1933, at his home in Hamilton. He was 66 years of age and is believed to have succumbed to heart disease as he was sleeping. Dr. McClenahan had complained of pains in the breast earlier in the day, and a physician was called. The latter, however, did not believe the symptoms were dangerous, and Dr. McClenahan was advised to rest quietly. When Mrs. McClenahan went to call him later, she found him dead.

Dr. McClenahan was born in Nelson Township, and graduated from Trinity College in 1894. He practised for several years in Waterdown, and came to Hamilton in 1912, when he was appointed Provincial Officer of Health of District No. 3, embracing nine counties.

He was a member of the Toronto Academy of Medicine, the Hamilton Medical Society, the American Health Association and other bodies, in some of which he had held office. During the Great War, Dr. McClenahan was a Captain and served as Medical Officer of Health of the camps in this district. He was stationed at Welland.

Dr. McClenahan is survived by his widow and two sons, R. Roy, in Toronto, and Harold, at home.

Dr. John Alexander McNaughton, of Brussels, Ont., died at his home on February 9, 1933, in his seventy-seventh year. He was M.B. (1880); M.D., C.M., Trinity University (1881) and L.L.M., R.C.P. (Edin. 1883).

Dr. François Pépin, Montreal, one of the last interns to be admitted to the Nôtre-Dame Hospital, died after a short illness on January 24, 1933. He was only 27 years old, and was considered to have a brilliant career ahead of him. He was born in Montreal, and studied at the College of Sainte-Marie. At the University of Montreal he was considered one of the most talented students in the faculty of medicine.

Dr. Leverett H. Price, one of Moncton's most highly esteemed residents, passed away in the City Hospital on March 1st, after an illness of a few days. Dr. Price was born in Havelock, N.B. in 1867 and was an outstanding member of the medical profession in the province. He was one time President of the New Brunswick Medical Society, and at the time of his death was a member of the Council of Physicians and Surgeons of New Brunswick. Dr. Price was keenly interested in golf and owned a very fine private golf course at Shediac. He was a graduate of Bellevue Hospital Medical College, New York (1892).

Dr. Charles E. Rivier, of Quebec, died on January 26, 1933, at the age of 80. He was born in France and completed his studies there, after which he went to Germany and the United States. Later he was stationed for about ten years in Turkey. He lived in Quebec for about fifty years, and was for a long time in the Civil Service as an interpreter in the department of mines.

Dr. Ronald Steele Saddington, of Port Credit, Ont., died on February 4, 1933, another martyr to devotion to science. He died in New York of Rift Valley fever, an obscure tropical disease prevalent in

Kenya, British East Africa, somewhat similar to infantile paralysis.

Dr. Saddington had been connected with the Rockefeller Institute since 1931, where he had concentrated on his chosen field of virus diseases. Recently he had been working on herpes. His last illness seized him at Christmas time, and Dr. Saddington, knowing that he would be unable to recover, continued his research work, aiding in the recording of the fruits of his long research so that others might continue where he left off.

Dr. Saddington was the son of Ven. Archdeacon and Mrs. Saddington, of Port Credit, and was recognized by his medical associates as having a bright future.

He was born in Richmond West, Ont., on June 6, 1902, and attended Almonte Public and High Schools, graduating from each with first-class honours. Before deciding on a medical career, he was employed in the business office of Harris Abattoir for several years. In 1927 he graduated from the University of Toronto with the M.B. degree. He then spent a year as an interne at St. John's Hospital, Cleveland. He later returned to Toronto, spending two years in pathological studies under Dr. Oscar Klotz. He then entered the Rockefeller Institute for Medical Research. He was known as an athlete, and was an expert player of tennis and squash. He had many interests in the field of art, and was an accomplished musician, having given a number of recitals on the pipe organ.

Besides his parents, Ven. Archdeacon and Mrs. Charles Saddington, Dr. Saddington is survived by two brothers and four sisters. They are: Charles, Montreal; Cyril, Port Credit; Mrs. Mildred Hutson, Barbados, B.W.I.; Mrs. Frances Mitchell, Toronto; Miss Blanche Saddington, Toronto, and Miss Grace Saddington, Port Credit.

Dr. Stuart Scott, for 43 years M.O.H. for Newmarket, Ont., died on January 4, 1933, in his seventy-third year. Dr. Scott was born at Colborne, attended school at Gananoque, and graduated in medicine at Trinity University, Toronto, in 1885. He began practice in Lloydtown and removed to Newmarket in 1889.

A memorial to Dr. Scott exists in the town's newest public school, named the Stuart Scott School, in honour of his services on the School Board from 1889 to 1926. He was also a former President of the York County Medical Association.

He is survived by one son, Douglas, of Toronto.

News Items

Alberta

The annual meeting of the Council of the College of Physicians and Surgeons of Alberta was held in Calgary on January 20, 1933, when Dr. W. A. Wilson, of Edmonton, was re-elected President and Dr. R. B. Francis, of Calgary, Vice-president. Dr. G. R. Johnson, of Calgary, was re-elected Registrar-treasurer and Mr. W. G. Hunt assistant to the Registrar. Dr. W. S. Galbraith, of Lethbridge, was re-elected a representative on the Dominion Medical Council and Dr. W. A. Wilson the other representative. On account of the general financial depression the Council decided to reduce the combined fee of the members of the College of Physicians and Surgeons, from fifteen to twelve dollars for 1933, and in order to do this reduced the office expenses proportionally.

The Council discussed at some length the surgical aid fund of the Workmen's Compensation Board. Dr. H. K. Groff represented the Workmen's Compensation Board and presented a financial report which showed that due to the financial depression the average accident patient cost the Board more for hospital and medical care as well as more for administration expenses. The Compensation Board has decided to raise the assessments of certain industries for the compensation fund, as well as increasing assessments from the workmen, and that the fees for surgical services should be discounted substantially for this year.

The Council realized that something should be done and were of the opinion that all who shared in the contributions to the fund or who received cash or other benefits from it should share in the loss. The Council members agreed that no accounts of five dollars or under should suffer a reduction and that no accounts over that amount should be reduced by any discount which would make them less than five dollars and that no discount should be greater than twenty per cent. Fifteen per cent should be sufficient. A committee from the Council met members of the Workmen's Compensation Board later on and urged the adoption of the suggestions which had been made by the Council. The Compensation Board agreed that the smaller accounts should not be reduced but considered that for the present time all other accounts should be lessened by twenty per cent. The chairman of the Board regretted the necessity, but thought that these changes might be temporary, at least he hoped that they might be so.

The Council appointed a special committee to continue the representation on the executive committee of the Rural Municipalities, who will urge rural councils to assume the responsibility placed on them by the Provincial Legislature to furnish "food, clothing, shelter and medical care and treatment for indigents", which up to the present time has been very indifferently undertaken and even at that not generally throughout the province. Physicians are willing to accept less than the regular fees for this work and are agreeable that a provincial government assessor should examine and pass on all of the accounts rendered.

At the present time those who operate power machines on farms do not come under the Workmen's Compensation Act. Representation will be made to the Provincial Legislature that the Act should be so altered that medical and hospital care will be provided in accident cases, *but not compensation.*

Premier Brownlee has made the announcement that during the present session of the Legislature there will not be much legislation passed and that no program involving increased expenditure will be endorsed. It is therefore likely that the commission studying health insurance will not make a definite report which would suggest an immediate inauguration of any scheme involving governmental expenditure. The report will probably be an interim or progress one. In the meantime there is in the provincial statutes legislation which makes provision that allows municipalities to engage physicians on salary; whether the Provincial Government will make the suggestion that municipalities should provide funds for salaried physicians remains to be seen. A number of municipalities are in financial difficulties due to the fact that they were lax in collecting taxes during the good years, and some have placed their indigent relief financing in the hands of the Provincial Government and thus are under obligation to re-imburse the government when better times come. There will be much hesitation before any further obligations are assumed.

At the annual meeting of the United Farmers of Alberta a resolution was passed protesting against the refusal of the rural municipal hospitals to furnish medicines to patients free of cost. This farmers' organ-

ization considered that the time is ripe for the establishment of state medicine. If the Provincial Government was in possession of ample funds so that there would be no need of taxation the solution would be simple, but as taxes are necessary for the running of any government to meet requirements, in like manner with the rural hospitals, the farmers have only to increase the municipal taxes so that that the patients may have free medicines.

Another resolution passed by this organization requested the Provincial Government to enact legislation which will permit the chiropractors to become members of the staff of a rural hospital. These practitioners have so far been quite rightly barred from hospital staffs.

One other resolution passed by the United Farmers of Alberta requested that surgical rates to indigents in rural hospitals should be on the same level as those paid by the Workmen's Compensation Board. Some years ago the medical profession made an offer to carry out what is now suggested. This plan could be put into operation as soon as rural councils give the necessary sanction.

Much gratification is felt among the physicians of Calgary at the well deserved and high honour bestowed upon Dr. W. H. McGuffin who has been elected President of the Radiological Society of North America at the annual meeting held at Atlantic City. He has been in our midst for many years and is deservedly popular with his confrères. His ability and high ideals have brought him a fitting reward. G. E. LEARMONTH

British Columbia

Plans for the meeting of the Pacific North-West Medical Association in Vancouver, July 4th to 7th, are maturing. The list of guest speakers is now complete, and includes Dr. S. A. Kinnier Wilson, of London, Eng.; Prof. Wm. Boyd, of Winnipeg; Drs. A. T. Bazin and A. H. Gordon, of Montreal; Drs. J. G. Fitzgerald, C. H. Best and D. E. S. Wishart, of Toronto, and Dr. A. T. Mathers, of Winnipeg. A large attendance is expected from the neighbouring States, and this promises to be one of the best conventions ever held at the coast. Information regarding the meeting can be obtained from Dr. L. H. Appleby, 925 West Georgia St., Vancouver, B.C.

The present session of the Legislature will again see the perennial attempt of the chiropractors and drugless healers to obtain legal standing. This time, it is announced, they will conduct separate campaigns, their last attempt, made in unison, having apparently led to some mutual misunderstandings. From present indications, the House is going to be so fully occupied with unemployment and financial problems that there will be little time to devote to private bills.

The municipalities, which are now bearing the greater part of the cost of mothers' pensions, are pressing for a reduction of the scale of pensions; grants to municipalities by the Provincial Government have been greatly reduced; relief costs are mounting and tax collections diminishing, so that it seems safe to predict that health insurance will not even be mentioned.

The Vancouver Medical Association has opened negotiations with the civic authorities, with a view to obtaining more equitable treatment for members of the profession. Under existing conditions, many general practitioners are heavily assessed by the city for little more than the privilege of supplying free treatment to the indigent sick. C. H. BASTIN

Manitoba

The report of the Department of Health and Public Welfare submitted to the Legislature in February showed that definite progress was being made in the warfare against communicable diseases. Deaths from diphtheria reached a record low, with but 25 deaths, and the number of cases, 410, was the lowest recorded in many years. These figures for diphtheria are now only about one-quarter of what they were five years ago. The credit for this change is given largely to the use of toxoid. All communicable diseases showed decided improvement, save typhoid, but even that has shown an improvement over 1931. Typhoid is prevalent only in rural areas, small towns and villages where the sanitary arrangements are primitive. The use of typhoid vaccine for the prevention of the disease is steadily increasing. An outbreak of trachoma was found among school children at Foxwarren. The disease had been brought into the community by two families who came from Russia by way of Mexico. A definite lessening of the tuberculosis menace is noted. Deaths from this disease, including Indians—among whom the death rate is much higher—total 351 for the year. There was also a decrease in the number of cases of venereal diseases.

On February 24th a portrait of the late Dr. Gordon Bell, first Professor of Bacteriology in the Manitoba Medical College, was presented to the College by Dr. Bell's sister, Mrs. Dunlop, of Toronto. Hon. Dr. E. W. Montgomery gave an address eulogizing the courage, humour, friendliness, love of books and of nature which were dominant traits in the character of Gordon Bell. In the unavoidable absence of Mrs. Dunlop, Dr. Lennox Gordon Bell, son of Dr. Bell, formally presented and unveiled the portrait which is by the celebrated artist, Joshua Smith.

A plan for the care of patients in receipt of a direct unemployment relief has been proposed by the special committee appointed to study this question by the Winnipeg Medical Society and the Manitoba Medical Association and this plan will be forwarded to the Mayor and Council of the City of Winnipeg. The plan provides that any person on relief requiring medical services may call his family physician, who will notify the Central Registration office of such attendance within twenty-four hours. Payment for such service, on a basis of 50 per cent of the regular schedule of fees, is to be paid for by the City Health Commission. If further attention is required the physician is to fill out a report which will estimate the amount of attention likely to be required and the Central Registration office may authorize further attendance. Medical treatment is to cover medical, surgical and obstetrical cases. The medical profession promises to give every assistance to the Relief Commission in preventing or arresting abuses and in promoting the smooth working of the arrangement. It is estimated that if such a scheme were put in operation it would effect a considerable lessening in the amount of hospitalization.

The annual meeting of the Sanatorium Board of Manitoba was held on February 7th. The financial statement showed a deficit for the year of nearly $23,000 due to the fact that many of the municipalities have not been able to pay the municipal levy. Dr. D. A. Stewart, Superintendent of the Manitoba Sanatorium, pointed out that costs at Ninette and the Central Tuberculosis Clinic had been reduced during the year by nearly 12 per cent, yet receipts had been so greatly cut that the financial position was extremely difficult. The demands for care and the amount of care given were greater than ever before, but the means of giving this care had shrunk in every direction. It appears that services will have to be curtailed. Dr. Stewart pointed out that the Indians in Manitoba constituted a menace from the

standpoint of tuberculosis, since their death rate from that disease was 19 times that of the whites. Fully half of Manitoba's tuberculosis disease and fully half of its tuberculosis problem lay in Reserve Indians, who are wards of the Federal Government, and in Manitoba citizens of mixed Indian blood.

Hon. R. A. Hoey, Minister of Health and Public Welfare, introduced into the Legislature a bill providing for sterilization of mental defectives, who, if such treatment were given, would not require institutional care. While there has been some criticism, it appears likely that the bill will be passed by the Legislature.

The ratepayers of the Municipality of Eriksdale met recently to protest against the action of the Municipal Council in reducing the retaining fee of Dr. R. B. Pozer by $400. They passed a resolution calling upon the council to restore the doctor's fee and, failing acquiescence on the part of the council, another meeting will be held at which it is proposed to demand the resignation of the reeve and council.

The Manitoba Hospital Association strongly protests the proposed action of the Government in reducing the *per diem* grant for patients in hospital from 50c. to 40c.

The City of Winnipeg is seeking authority from the Legislature compelling indigent patients resident in the city and who need hospital attention to be treated in hospitals within the confines of the city. It is pointed out that last year $147,000 was paid out to outside hospitals for the treatment of Winnipeg residents who were indigent.

ROSS MITCHELL

New Brunswick

On March 3rd, the report of the New Brunswick Provincial Hospital for the Insane was submitted in the Legislature at Fredericton. There were 842 patients in residence at the beginning of the fiscal year and 870 at the end of the year. The total number of patients during the year was 1026, a daily average enrolment of 854. Since the hospital began to function, eighty-five years ago, 11,429 patients have been treated. The average daily cost of maintaining the patients last year was $0.66½. For the last few years there have been annual additions to the building and equipment of this excellent institution.

During the session of the local Legislature, Hon. Dr. H. I. Taylor, Minister of Health and Labour, was the recipient of cordial felicitations, accompanied by a bouquet of twenty-five roses as a token of appreciation from his associates on completing twenty-five consecutive years as a member of the local house. The Premier of the Province and the Leader of the Opposition joined in the expression of good wishes of the house.

During the past month an emergency meeting of the Executive of the New Brunswick Medical Society was held in the City of Saint John, to consider a submitted new schedule of Workmen's Compensation fees. The consensus of this meeting was that the Compensation Board was attempting to pass too large a percentage of the results of the depression along to the physician. The special liaison committee which has been in existence for several years was instructed to carry on further negotiations with the Compensation Board in an effort to arrive at a more equitable arrangement. A parallel committee, representing the New Brunswick Hospital Association, is also engaged along similar lines.

The aeroplane as an aid in the practice of medicine is still sufficient of a novelty in this Province to make it worthy of note that during this winter when ordinary methods of communication were difficult, if not impossible, a physician from Saint John had recourse to this newer method of travel to enable him to reach a patient in the Grand Lake district.

The Saint John General Hospital was honoured by a visit from His Excellency, the Governor-General, on his recent visit to the winter port of Canada. His Excellency has always shown a very kindly interest in all departments of the hospital, particularly the staff, both medical and lay.

During the early part of this winter, the incidence of measles and scarlet fever has been rather greater than usual, and a feature to be noted is the frequency of middle-ear complications. The number of cases of mastoiditis has been remarkable, but fortunately the recovery following operation has shown a very high per-percentage.

A. STANLEY KIRKLAND

Nova Scotia

The Immunization Clinic, at present conducted at the Public Health Centre in Halifax, has got off to a splendid start. During the first few weeks over 200 children have had the Schick test carried out on them. Most of the cases so far have come from local institutions, but a fair number are from families in Halifax and Dartmouth. Those persons able to afford medical fees are advised to see their family physician; those unable to do so receive attention at the Clinic. This project was made possible by funds from the Junior Service League.

The balance of the Massachusetts-Halifax Relief Fund has been turned over to Dalhousie University. The interest on this balance is to be devoted to any activity for the prevention of diseases in Halifax and Dartmouth.

Dr. H. G. Grant, Dean of the Faculty of Medicine, brought to a close a series of lectures sponsored by the University. He took as his subject "Medical conquests." In the course of his lecture he pointed out that vaccination against small-pox was gradually diminishing on account of conscientious objectors. He quoted figures as follows: out of 12,691 school children in Halifax city, 5,223 were vaccinated and there were 7,180 conscientious objectors. In Halifax County, exclusive of the city, there were 2,621 conscientious objectors. Further, stress was laid upon the safety of modern technique and the severe consequences in the event of an epidemic.

Halifax City Council has been appealed to by the authorities of Dalhousie University for a grant towards the work carried out at the Public Health Centre. The claim is made that the sum requested is necessary to carry on the work. Unless this aid is forthcoming, it may be necessary to close the Clinic.

The March issue of the *Nova Scotia Medical Bulletin* has considerable matter of very urgent interest to the profession. The leading article is a report of a lecture delivered before three branch societies by Dr. Harvey Clare, of the Homewood Sanatorium, Guelph. The general title is "What general practitioners should know about mental disease."

A good deal of space is also devoted in this issue to economic questions as affecting the medical profession. The appropriateness of this was exemplified by groups of practitioners in more than one County appealing to the Municipal Councils. The ground of appeal was that if persons in receipt of relief became ill and were attended by medical men, the Municipality should remunerate the practitioner.

A short course of four weeks on the education of nurses was recently completed at St. Francis Xavier University, Antigonish. It was inaugurated for instructors in various schools of nursing in the province in order to help them qualify for standard requirements. The course was based mainly on the recommendations in the report of Professor Weir on Canadian Schools of Nursing. As a result of these recommendations the extension department of St. Francis Xavier offers short courses in which nurses may receive a special training that will better qualify them for teaching. The following subjects were taught in the first period of the course: educational psychology; principles of education; and mental hygiene.

N. B. DREYER

Ontario

The Honourable J. M. Robb, M.D., Minister of Health for Ontario, made an announcement early in February, to the effect that the Government had completed the preparation of radon seeds, and that the first of these seeds were being distributed from the laboratory to the hospitals.

Lack of public ward accommodation is evident in the Toronto General Hospital, and the authorities have opened a whole floor of the new Private Patients' Building. These beds will be used exclusively for Workmen's Compensation cases. By removing these cases from the wards, 45 more beds will be available for public ward cases.

The Government has announced the following as the supervising committee at the new cancer clinic at Kingston; H. M. Wilder and C. C. Folger, of Kingston. The two representatives named by the Kingston General Hospital are W. T. Minnes and R. E. Burns, while the appointee from Queen's University is A. J. Meiklejohn.

Dr. G. F. Marrian, of the University of London, has been appointed Associate Professor of Biochemistry at the University of Toronto. Dr. Marrian is the author of many scientific publications in the fields of physiology and biochemistry, and has specialized on secretions of the ductless glands.

Dr. Angus D. McLachlan, a recent graduate of the University of Western Ontario, who has been awarded the Rhodes Scholarship, was recently a recipient of the Royal Humane Society medal. Last summer, he rescued eight men from drowning in the heavy surf at Port Stanley.

The Library Committee of the Academy of Medicine, Toronto, has recently made arrangements whereby Fellows in any part of the city may have books delivered to them from the Academy, at the rate of fifteen cents per parcel.

J. H. ELLIOTT

Quebec

Dr. S. Hanford McKee, Clinical Professor of Ophthalmology of McGill University, was invited to take part in the proceedings of the Kansas City Society of Ophthalmologists and Oto-Laryngologists at their meeting in Kansas City on March 16th. Dr. McKee gave clinics in the morning at the General Hospital and discussed cases and pathological specimens, and in the afternoon conducted an operation. In the evening he spoke before the Society on "The relation of the pathological man to clinical ophthalmology."

The amalgamation of the Montreal Foundling and Baby Hospital with the Children's Memorial Hospital is announced. The Foundling Hospital as such thus passes out of existence. The amazing record of this institution has shown what can be done to conserve infant life. When the Foundling Hospital originally came into being over forty years ago, mortality rate among its infants was 96 per cent. Science, and loving care, however, triumphed over every difficulty, and babies that were brought in, in almost a hopeless condition, were quickly restored to health and normal life, with the result that a mortality of 96 per cent was brought down to 4.1.

The number of public patients receiving free services in the Montreal Homœopathic Hospital is increasing at the rate of approximately eight per day, as compared with the corresponding period of last year, and this indicates the tremendous demands on the hospital for free work, which necessitates the appeal to the public for $100,000 which will be held from March 25 to April 1, it was reported at campaign headquarters to-day.

In January, 1932, 336 patients used the out-patient departments; in January, 1933, this number increased to 655. In February, 1932, there were 518 patients as compared with 698 last month, so that altogether, there has been an increase of 500 patients in the first two months of this year as compared with the first two months of 1932.

The campaign committee is emphasizing the point that the Homœopathic Hospital has always operated on the "open door" policy and any reputable physician or surgeon practising in the Province of Quebec may bring his patients and treat them in the private and semi-private wards. In evidence of this fact, last year approximately 1,600 patients were treated by homoeopathic physicians and approximately 1,100 by the patient's family physician.

The Homœopathic Hospital is in every sense a general hospital, with a total of 90 beds (50 private and semi-private and 40 public beds).

One floor of the hospital is used entirely for maternity cases and the hospital enjoys an enviable record for this phase of its work. During the past five years, 2,790 babies have been born in the public wards of the maternity departments; no deaths have occurred.

General

The Canadian Association of Massage and Remedial Gymnastics. — The medical profession of Canada does not appear to be widely apprised of the fact that there exists in our country an organization whose object is to provide reliable and thoroughly trained persons to carry out various forms of physiotherapy. It will be readily admitted that such an organization has a distinct and desirable *raison d'etre*, for there is no form of medical treatment which lends itself more readily to exploitation by quacks and the poorly trained than does physiotherapy. Accordingly, some facts about The Canadian Association of Massage and Remedial Gymnastics will, doubtless, be of value.

The Canadian Association of Massage and Remedial Gymnastics was incorporated by Dominion Charter in 1920. The members of the Association bind themselves to work only under medical direction and not to advertise in any way except in recognized medical journals. Their offices have no signs, and, therefore, it is only through the intermediation of medical men and hospitals that their services can be obtained.

The standard of training is high. The requirements at present are a two-years' course of training in university and hospital in remedial gymnastics (which includes the re-education of muscles, and pre- and post-natal work), massage, electro-therapy, and all forms of treatment by heat and light. This course

is provided by the University of Toronto. In addition, the University arranges that the graduates in the above course shall serve for six months as interns after graduation, which service is obligatory. In this way valuable experience in clinical work is obtained.

Members may be accepted from other recognized schools or bodies, such as the Chartered Society of Massage and Medical Gymnastics of Great Britain, and one or two others in the United States. Aspirants for admission to the roll of the Canadian Association must show proof of having had at least one year's training under qualified leaders and a certain amount of clinical experience. All others must sit for examination.

In view of this standard doctors can be assured of receiving technical aid from persons who are well skilled in their craft, and who submit to an ethical code which ensures loyalty to the medical profession.

The officers of the Canadian Association of Massage and Remedial Gymnastics are the following: *Honorary President,* Dr. F. W. Harvey, Montreal, *Honorary Vice-presidents,* Drs. W. E. Gallie, Toronto, and A. K. Haywood, Vancouver; *President,* Miss B. H. Hally, Toronto General Hospital; *Vice-president,* Mrs. H. A. McKean, 458 Mt. Stephen Ave., Westmount, Que.; *Sec.-Treasurer,* Miss E. Henderson, 21 Madison Ave., Toronto; *Educational Secretary,* Mrs. W. H. Woodcock, 17 Unsworth Ave., Toronto.

Registers are kept in the larger cities of Canada and members of the Association can be obtained for private work on application to the following: Montreal, Miss Henderson, 1455 Chomedy St., Montreal, Tel. Wilbank 0786; Toronto, Miss E. Henderson, 21 Madison Ave., Toronto, Tel. Ki. 2380; Vancouver, Mrs. A. V. Earle, 6059 Elm St., Vancouver, Tel. Kerrisdale 1520 R.

Any doctor wishing to know if there is a member of the Association in his district can obtain a list of the members on application to the Secretary-Treasurer, Miss E. Henderson, 21 Madison Ave., Toronto.

The Third International Hospital Congress will be held this year at Knocke-sur-Mer, Belgium, from June 28th to July 3rd, and will be followed by a five-day study-tour through Holland.

The Congress will meet in the forenoon and afternoon of each of the five days. The opening meeting takes place on Wednesday, June 28th at 5 p.m. Besides these sessions, amusements, receptions, and excursions will not take place. The delegates to the Congress will, however, have an opportunity for pleasant intercourse every evening; they can also make private excursions to Bruges, Sluis (a small Dutch town which has retained its old world character), and the various resorts on the Belgian coast.

As a result of the experiences gained at the first two International Congresses, it is the intention of the Third International Congress to make available the collected information and experiences of the ten International Study Committees of the Association, for the further development of hospital work. The study committees will for this purpose draw up reports based on an international exchange of well known experts of the different countries. These reports will, to some extent, form the basis of resolutions agreeing on international lines of action, but the purpose will not be the formation of a rigid scheme, but will rather aim at a general improvement and perfecting of the work of the hospital. All the reports based on the transaction of the congress will be published in the April issue of *Nosokomeion,* the official organ of the Association. They will be considered at the congress and the conclusions arrived at will be passed on to the League of Nations and the governments concerned.

The members of the International Hospital Association are entitled, without further subscription, to take part in the congress. Other persons, associations, and authorities who wish to take part in the congress can either become members of the National Association, or simply announce that they are coming.

The extraordinary members pay a yearly subscription of $5, this entitles them to participation in the Congress and Reports of the Association, and they will receive its organ *Nosokomeion* which appears in quarterly numbers and publishes the programs and transactions of the Congresses. For attendance at the Congress alone $2 is charged. This payment does not include publications.

Address all communications, questions, reports, and suggestions, to Herrn Geheimrat Dr. W. Alter, Buchschlag, Hessen, Ernst Ludwig-Allee 2, Germany. *President,* Dr. René Sand, 2 Avenue Velasquez, Paris 8e, *General Secretary,* Dr. E. H. L. Corwin, 2 East 103rd Street, New York, N. Y., U.S.A.

The International Congress of Nurses.—The Congress, a quadrennial event, was last held in Montreal in 1929, when 6,900 nurses from all parts of the world were in attendance. This year a much greater number is expected, in view of the advantageous position of the Canadian dollar in relation to continental currency.

Four ships, the *Empress of Britain* eastwards, and the *Duchess of York, Montclare, Duchess of Richmond,* and *Empress of Britain* on the return journey, will be used, and the various tours range in length from 28 days to 57 days, according to the amount of territory taken in. The main tour, occupying 28 days, from Quebec back to Montreal, starts with the departure of the *Empress of Britain* from Quebec, July 1st. Cherbourg is reached on July 6th. Five days are spent in Paris.

The whole congress then moves to Brussels by rail on July 13th for further deliberations, which culminate in a farewell banquet on July 15th.

Mlle. Chaptal, president of the International Council of Nurses, in a message to members of the Canadian Nurses Association, says that for months preparations have been in progress both in France and Belgium. "Real continental hospitality," her message continues, "will be forthcoming for the benefit of all Canadian nurses who attend."

Each day group luncheons will be held, both in the Paris and Brussels sections, and official visits and excursions are to be part of the program.

The main party visits Waterloo on July 16th, and leaves for London, via Ostend and Dover, the following day. Two days are to be spent in London before embarkation at Liverpool in the *Duchess of York,* July 21st.

Five tours, through Europe and six extension tours are included in the program. They include France, Belgium, Germany, Switzerland, England, Scotland, Italy, the French Riviera, Rome, Czecho-Slovakia, Austria, the Alps, and the chateau country, in various combinations.

While no program of hospital visits has been planned, inspection of hospitals and nursing institutions can be arranged for those who wish to do so in England, Scotland, France and Belgium, Germany, Austria, and Switzerland.

Third International Pædiatric Congress.—*President,* Prof. G. F. Still; *Treasurer,* Dr. Hugh Thursfield; *Secretary,* Dr. Leonard Findlay, 61, Harley St., London, W.1.

The Third International Pædiatric Congress will take place in London on 20th, 21st and 22nd July, 1933, and will be held in the central part of London (the exact location will be announced later).

Membership of Congress.—Members of a recognized medical society are eligible for membership of the Congress, but they must be nominated by their own National Committee.

Fee for membership of Congress.—The subscription for medical men or women (active members) attending the Congress is two pounds sterling (or two pounds and

ten shillings to include a copy of the Transactions) and for non-medical individuals accompanying active members one pound sterling. All subscriptions are payable in advance to the Treasurer, Dr. Hugh Thursfield, 84, Wimpole Street, London, W.1.

Conduct of Congress.—There will be two sessions daily from 10 to 13 o'clock in the morning and from 14.30 to 16.30 in the afternoon.

Two of the morning sessions will be devoted to General Discussions. The following two subjects have been selected for discussion: (A) The Nature of Allergy and its Rôle in Diseases of Children, which will be introduced by—Prof. Hamburger, Vienna; Dr. Pehu, Lyons, and Dr. Arnold Rich, Baltimore. (B) The Prophylaxis of Milk-borne Diseases, which will be introduced by Prof. Allaria, Turin; Prof. Bessan, Berlin; Prof. Lereboullet, Paris, and Prof. Pettersson, Stockholm.

The other morning session and the various afternoon sessions will be devoted to the reading of independent papers. Further information may be obtained from the Secretary.

The American Association for the Study of Goitre will meet on May 15, 16, and 17, 1933, at Memphis, Tenn. The program, which is a very full one consists of hospital and diagnostic clinics and formal papers.

Members of the profession in good standing are cordially invited to attend this meeting. They are also urged to join a special group sailing from New York City, July 26th, to attend the *International Goitre Conference* to be held in Berne, Switzerland, August 10, 11, and 12. Special rates have been provided and daily programs arranged while en route to Le Havre. Those who are interested should communicate with J. R. Yung, M.D., Corresponding Secretary, Terre Haute, Ind., or S. D. Van Meter, M.D., Chairman, Denver, Colorado.

Book Reviews

The Biochemistry of Medicine. A. T. Cameron, M.A., D.Sc., F.I.C., F.R.S.C., Professor of Biochemistry, and C. R. Gilmour, M.D., C.M., F.R.C.P.(C.), Professor of Medicine and Clinical Medicine, University of Manitoba. 506 pages, illustrated. Price 21/-. J. & A. Churchill, London, 1933.

In the past two or three years quite a series of books of varying merit has appeared on the relation of biochemistry to medicine; nearly all of these have been especially planned to aid the clinician in the interpretation of laboratory reports on quantitative analyses of blood and urine, and not a few have cumbered their pages with recipes for the execution of these analyses (which would be sought elsewhere by any one trained to carry them out). The present volume is wider in its range and less materialistic in its outlook. It seeks, not unsuccessfully, to relate the whole science of biochemistry to the art of clinical medicine. The authors hope that it may be useful both to the student entering the clinical arena and to the physician who has lost touch with biochemistry. Concepts from physical chemistry have been used only when absolutely necessary, and are very lucidly expounded; organic chemistry has also been reduced (perhaps not to the minimum) and compressed into footnotes. Each chapter is followed by a condensed summary and a representative bibliography. The book is written in a positive, almost dogmatic, style, which, though at times infuriating to the specialist, is probably well suited to the average reader. In some respects the work is almost startlingly up-to-date; there is, for instance, a rather full account of Castle's work on pernicious anæmia. Certain sections, however, show evidence of having been written some time ago and not recently revised: this applies, for instance, to the definition of the unit of insulin, to the statement that pancreas is fed to depancreatised dogs in order to provide them with digestive enzymes, to the statement that histamine stimulates the secretion of pepsin rather than that of hydrochloric acid (contradicted by a paper referred to in the bibliography!). The indubitable rôle of the anterior pituitary in stimulating and maintaining the thyroid is not mentioned. Werner's formula for urea is misquoted, and the statement that ten amino-acids have been shown to form carbohydrate when given to depancreatised dogs is not correct; the phlorhizinized dog has been used in almost all experiments of this type. These, however, are minor blemishes; as a whole, the book is judicious, learned, yet readable; it is packed with information, and at its very reasonable price deserves a large public.

Growth. The late James Lorrain Smith, M.D., LL.D., D.Sc., F.R.S., Professor of Pathology, University of Edinburgh. Edited by J. S. Haldane, C.H., M.D., F.R.S. 135 pages. Price 6/-. Oliver & Boyd, Edinburgh and London, 1932.

The great interest of Prof. Lorrain Smith in the subject of growth and his prolonged study of the processes involved led him to prepare a book covering his observations and analysis. Interrupted by his final illness the work was left unfinished. He had hoped to embody the general conclusions he had found as to the nature of life and the bearing of these conclusions on abnormal forms of growth. Fourteen chapters, practically completed, have been edited by Prof. Haldane, whose close relation to Prof. Smith allowed him to make a general summary of conclusions in a final chapter.

Biologists, physiologists and pathologists will be stimulated by these studies and conclusions prepared by a keen observer and philosopher. Beginning with the procession of growth in general, cell division and cell growth, successive chapters deal with special tissues and organs, skin, blood, bone, connective tissue, fat, vessels, liver, muscles, nervous system and tumours. In some cases the process of repair is also discussed making the volume one to be read by the student, surgeon and physician.

In early life growth is active and the body as a whole increases in stature and girth. Later this intense activity of growth lessens as the body reaches its normal adult size when further increase ceases. As growth becomes less active the master activities of gland, muscle and nerve come into full play, the structures required have been formed, and thereafter the only purpose to be served by growth is the maintenance of the structures which have been produced.

We are told it was Lorrain Smith's ideal to make the distinctive conception of life the basis of pathology. His training in philosophy had set him free from the mistaken realism which has for long introduced confusion into the biological sciences and has led on the one hand to vitalism and on the other to vain attempts to interpret life in nothing but the light of traditional physical and chemical conceptions. He was always thinking himself, and all readers of this remarkable book will be stimulated to think for themselves.

Internal Medicine: Its theory and practice. Edited by John S. Musser, B.S., M.D., F.A.C.P., Professor of Medicine, Tulane University of Louisiana School of Medicine. 1316 pages, illustrated. Price $10.00. Lea & Febiger, Phila., 1932.

The specialization in authorship, formerly characteristic of "Systems" of Medicine, is tending to be adopted more generally in the hand-books. A leaf has been taken out of Cecil's text-book in this respect.

The treatment of
MENSTRUAL DISORDERS
with Emmenin and A.P.L.

The recent presentation of these two hormones offers definite advantages in the treatment of functional menstrual disorders. The permanent character of the results obtained justifies the belief that Emmenin and A.P.L offer a superior therapy to that of the substitution type. Outstanding indications are dysmenorrhea (when pain precedes the flow), migraine (based on endocrine disturbances), menopausal symptoms, amenorrhoea (secondary types) menorrhagia and metrorrhagia.

Emmenin Liquid is available in original, specially sealed four ounce (120 c.c.) bottles only.

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THE COMPLEX TYPE is indicated in the treatment of dysmenorrhoea, migraine and menopausal disturbance. *Orally active.*

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This anterior pituitary-like hormone of the placenta is particularly indicated in menorrhagia and metrorrhagia. *For subcutaneous injection.*

A. P. L. is available in ampoules of 1 c.c. (six in a box) and in 5 c.c. rubber stoppered bottles.

These oestrogenic placental hormones are prepared and biologically standardized in accordance with the technique of Dr. J. B. Collip, Department of Biochemistry, McGill University, (C.M.A J. 22: 761, 1930). Descriptive pamphlets mailed on request.

AYERST, McKENNA & HARRISON Limited, *Pharmaceutical and Biological Chemists*, MONTREAL

Musser's book, like Cecil's, is exclusively of United States' authorship. Perhaps the ideal text is yet to be compiled which shall be a composite of international medicine though the difficulties besetting its editorship might well be discouraging.

In this text a novelty has been introduced in the matter of classification. Internal diseases are grouped in four parts: (1) infectious diseases; (2) systemic diseases, including circulatory, respiratory, alimentary, urinary, endocrine, blood, spleen and reticulo-endothelial, and locomotor; (3) diseases of nutrition, allergy, metabolism, physical and chemical agents; (4) diseases of the nervous system, including mental disorders and organic diseases of the nervous system. While it is doubtful if this arrangement has any more scientific value than the conventional schema of yesteryear, nevertheless the introduction of a reticulo-endothelial system is a helpful procedure.

One notes under "typhoid fever" that in dealing with the symptoms it is stated there is ulceration in the second week and necrosis in the third week. We assume that this is either a typographical error, or that the author's revision of his proof was too hurried.

The segregation of the coccal diseases in one chapter is interesting and expedient. In fact the arrangement of the infectious diseases in clearly defined groups is very acceptable. A new note has been struck in grouping the commoner exanthems under the heading of the contagious diseases of childhood. While this has a value in the visualization of this close relationship, it may not be strictly scientific in view of the fact that all these diseases do occur in adolescents and adults.

The electrocardiographic and blood pressure tracings in the cardio-vascular sections are helpful.

In the alimentary field, one of the striking points in the text is the replacement of the "gastric neuroses" by the single entity "indigestion". This is a swing of the pendulum from the preceding effort to exclude ambiguous terms and to be precise in diagnosis. It is debatable if the term "indigestion", so applied, clarifies the problem of gastric complaints of supposedly "functional" origin. Indeed one cannot help feeling that "indigestion" is an unscientific term and that the profession will not be better off by adopting it.

It is interesting also to note that in the treatment of peptic ulcer there is an emphatic distrust of special dietetics. More stress is placed upon the way of taking food than upon the food itself. There is also a minimization of drug therapy and the author is bold enough to say that alkalinization by continuous large doses is futile and inadvisable. Shades of Sippy, take note!

A commendable addition to the diseases of metabolism is "hyper-insulinism." This is a condition that has been brought to notice occasionally of late years in the literature. This may turn out to be of considerable importance in explaining away certain obscure cases of epileptiform, hysteroid, and even psychotic episodes. Now that it has become a text-book entity, the physician will be on the alert to search for it in the presence of the symptoms described.

A very unusual feature of text-books in Internal Medicine is the inclusion of the Psychoses. To a certain extent this is in keeping with the trend of things to nullify the divorce of psychiatry from neurology.

In a general way, the volume is an attractive one; one cannot help feeling that it is authoritative. An up-to-date library is not complete without a copy on its shelves.

Papers relating to the Pituitary Body, Hypothalamus, and Parasympathetic Nervous System. Harvey Cushing, Professor of Surgery (Emeritus), Harvard University. 234 pages, illustrated. Price $5.00. Charles C. Thomas, Springfield and Baltimore, 1932.

This book contains a lecture (reprinted from *The Lancet*) on the anatomy and physiology of the pituitary and neighbouring regions of the brain, papers (reprinted from the *Proceedings of the National Academy of Science*) on the surprising parasympathomimetic effects of pituitrin injected into the cerebral ventricles, a paper (from the *Johns Hopkins Hospital Bulletin*) on the puzzling syndrome of so-called "pituitary basophilism," and the Balfour lecture (reprinted from *Surgery, Gynecology and Obstetrics*) on the relation between peptic ulcer and injuries to the interbrain. All these are questions of importance and at present attract much interest, and this largely thanks to the author's own contributions. Anything written by Cushing is sure to be interesting and stimulating, even to those who cannot agree with all of his conclusions. Some very striking case-histories are discussed, and the experiments in the second section are of great importance. No doubt there are many, even of those who have already seen the published papers, who will be glad to read and own this book.

Sex and Internal Secretions. Edited by Edgar Allen, Professor of Anatomy, University of Missouri. 951 pages, illustrated. Price, $10.00. Williams & Wilkins, Baltimore, 1932.

This is an impressive and timely review of a subject in which research is at present very active. The net is cast widely, to include chapters on the genetics of sex in the fruit-fly and on psychological sexual drive in man, as well as those which one would more naturally expect to find within the covers. The list of contributors to the symposium—all are American—is an impressive one, and the majority of the sections are clear and well-considered. Too many of the contributors, perhaps, have been content to summarize the data from the voluminous literature—a valuable service in itself, but the opportunity for taking stock of the great problems of the field in the light of the accumulated data was a good one and little advantage has been taken of it. Particularly valuable, to the reviewer's mind, are the chapters on the mammary glands (C. W. Turner) and on the transport and viability of ova and sperm in the female genital tract (C. G. Hartman); the latter author holds the view that the germ-cells of either sex have only a very short life after liberation, and hence that in the human organism fertilization is an exceptional rather than a usual result of coitus. The book is written for the experimental worker, not for the clinician; indeed, it is remarkable how little the special problems of the human reproductive cycle are considered, and how little use is made of gynæcological observations. The chapter which seeks to bridge the gulf indicated is the least satisfactory in the book, discursive yet incomplete. Experimental biologists will welcome this summary of the literature. That some of the chapters should be already out-of-date was to be expected, so rapid is the advance of knowledge in this field at present.

Asthma, Hay Fever and Related Disorders. A Guide for Patients. Samuel M. Feinberg, M.D., F.A.C.P. 124 pages. Price $1.50. Lea & Febiger, Phila., 1932.

This is an excellent handbook on asthma in popular form. The various aspects of the disorder are clearly described and a reasonable account of treatment is given. One particularly useful chapter, both for the physician and the patient, is that on Special Data, in which there are listed the foods in which

MONTREAL DERMATOLOGICAL SOCIETY

POST-GRADUATE COURSE IN PRACTICAL DERMATOLOGY AND SYPHILOLOGY

MAY 8 TO MAY 20, 1933

A comprehensive course in Dermatology and Syphilology is offered under the auspices of the Montreal Dermatological Society, beginning Monday, May 8th, and terminating Saturday, May 20th, It is intended that this course should be essentially practical, and the ample and abundant material of the Montreal General, Notre Dame and Royal Victoria Hospitals is available. Demonstrations and clinical lectures will be given in both the English and French languages. The following programme is offered.

CLINICAL SESSIONS—FIRST WEEK

MONDAY, MAY 8 – – – MONTREAL GENERAL HOSPITAL.—9.30 a.m. to 12 noon.
TUESDAY, MAY 9 – – – NOTRE DAME HOSPITAL.—9.30 a.m. to 12 noon.
WEDNESDAY, MAY 10 – – ROYAL VICTORIA HOSPITAL.—2 to 4.30 p.m.
THURSDAY. MAY 11 – – MONTREAL GENERAL HOSPITAL.—9.30 a.m. to 12 noon.
FRIDAY, MAY 12 – – – NOTRE DAME HOSPITAL.—9.30 a.m. to 12 noon.
SATURDAY, MAY 13 – – ROYAL VICTORIA HOSPITAL.—10 a.m. to 12 noon.

CLINICAL SESSIONS—SECOND WEEK

MONDAY, MAY 15 – – – MONTREAL GENERAL HOSPITAL.—9.30 a.m. to 12 noon.
TUESDAY, MAY 16 – – – NOTRE DAME HOSPITAL.—9.30 a.m. to 12 noon.
WEDNESDAY, MAY 17 – – ROYAL VICTORIA HOSPITAL.—2 to 4.30 p.m.
THURSDAY, MAY 18 – – MONTREAL GENERAL HOSPITAL.—9.30 a.m. to 12 noon.
FRIDAY, MAY 19 – – – NOTRE DAME HOSPITAL.—9.30 a.m. to 12 noon.
SATURDAY, MAY 20 – – ROYAL VICTORIA HOSPITAL.—10 a.m. to 12 noon.

CLINICAL LECTURES — FIRST WEEK

ROYAL VICTORIA HOSPITAL.

Monday, May 8—4.30 to 5 p.m.

Elementary Lesions.

5 to 6 p.m.

Pharmacological principles in the therapy of skin diseases.—Dr. P. Burnett.

6 to 7 p.m.

The erythemas (erythema multiforme, toxic erythema and drug eruptions.)—Dr. L. P. Ereaux.

NOTRE DAME HOSPITAL.

Tuesday, May 9—5 to 6 p.m.

(*a*) Affections caused by animal parasites (pediculi, scabies, etc.)
(*b*) Herpes zoster.—Dr. P. Boulais.

6 to 7 p.m.

X-Ray, radium, ultra violet light therapy, high frequency and physical agents in dermatology.—Dr. A. Marin.

MONTREAL GENERAL HOSPITAL.

Wednesday, May 10—9.30 to 10.30 a.m.

Pyogenic infections of the skin (impetigo, Bockhart's impetigo, sycosis barbæ, etc.)—Dr. B. Usher.

10.30 to 11.30 a.m.

Trichophytosis and epidermophytosis.—Dr. J. F. Burgess.

MONTREAL GENERAL HOSPITAL.

Thursday, May 11—5 to 6 p.m.

Eczema.—Dr. J. J. McGovern.

6 to 7 p.m.

Eczema.—Dr. J. F. Burgess.

NOTRE DAME HOSPITAL.

Friday, May 12—5 to 6 p.m.

Syphilis.—Dr. A. Sabetta.

6 to 7 p.m.

Syphilis.—Dr. A. Marin.

CLINICAL LECTURES — SECOND WEEK

ROYAL VICTORIA HOSPITAL.

Monday, May 15—5 to 6 p.m.

Acne and seborrheal manifestations of the skin.—Dr. P. Burnett.

6 to 7 p.m.

Nevi and benign tumours of the skin (moles, angiomas, etc.)—Dr. L. P. Ereaux.

NOTRE DAME HOSPITAL.

Tuesday, May 16—5 to 6 p.m.

Syphilis.—Dr. A Marin.

6 to 7 p.m.

Tuberculosis of the skin (lupus vulgaris, tuberculides, lupus erythematosis.)—Dr. B. Usher.

MONTREAL GENERAL HOSPITAL.

Wednesday, May 17—9.30 to 10.30 a.m.

(*a*) Lichen planus. (*b*) Urticaria. (*c*) Alopecia Areata. —Dr. J. J. McGovern.

MONTREAL GENERAL HOSPITAL—*Continued*

Wednesday, May 17—10.30 to 11.30 a.m.

Deep fungus and yeast infections of the skin (blastomycosis, sporotrichosis, actinomycosis, etc.)—Dr. J. F. Burgess.

NOTRE DAME HOSPITAL.

Thursday, May 18—5 to 6 p.m.

Carcinoma of the skin.—Dr. P. Poirier.

6 to 7 p.m.

Carcinoma.—Dr. A. Marin.

MONTREAL GENERAL HOSPITAL.

Friday, May 19—5 to 6 p.m.

Psoriasis, pityriasis rosea and other erythemato-squamous eruptions.—Dr. P. Burnett.

6 to 7 p.m.

Coloured photographic lantern slides. Demonstration. —Dr. J. F. Burgess.

In order that this Course be held, it is considered that a minimum of twenty (20) applicants be received. A fee of $25.00 for the Course is charged. Applications should be sent in not later than April 25th and may be addressed to either

DR. B. USHER,
Medical Arts Building, Montreal

OR

DR. PAUL POIRIER,
2073 St. Denis Street, Montreal

certain of the more common sensitizing substances are found, such as wheat, egg, milk.

The Differential Diagnosis of Endocrine Disorders. Allan Winter Rowe, Director of Research, Evans Memorial, Massachusetts Memorial Hospitals, Boston. 220 pages. Price $4.00. Williams & Wilkins, Baltimore, 1932.

Diseases of the endocrines are in such a chaos, as far as clinicians are concerned, that they gladly welcome anything which will bring even a little order. Some of the earlier students in this rather difficult specialty made such preposterous statements that the medical profession looked rather askance at all of their contributions. Dr. Rowe has undertaken in a thoroughly scientific way, by careful physical examination, chemical tests, x-ray photographs, etc., to review all that was claimed, to reject those statements that are obviously erroneous, and to put on a sound basis the facts that relate to the endocrines. The work which he now presents has the merit of being the observations of many collaborators over a period of twenty years. The author has put them together in a very readable form and has avoided a new and unintelligible nomenclature which so many makers of books seem to think, in their holy zeal, is absolutely necessary. It would be difficult for the reader to ask any question relating to the subject that is not definitely answered, quite often in percentages obtained from the study of many patients, and these answers are all the more valuable because they are always compared with the normal.

On the whole, a book to be recommended to all interested in this important branch of medicine.

Office Surgery. Fenwick Beekman, M.D., Clinical Professor of Surgery, New York. 402 pages, illustrated. Price $5.00. J. B. Lippincott, Philadelphia, London and Montreal, 1932.

Dr. Beekman has accomplished a worthwhile task in producing a volume of this character for the general practitioner and to the preparation of which he has given much mature thought and consideration. This is not a text book of minor surgery but is of considerably wider scope and deals with surgical lesions of all types seen in office practice exclusive of those of the chest and abdomen. Emphasis is placed on diagnosis, while methods of treatment are adequately and soundly considered. Of much value are the chapters on superficial neoplasms and tumours of the breast which cover over fifty pages as well as that on regional infections. The text is clearly expressed and the illustrations are good. This book is worthy of a place on the general practitioner's desk.

A Text-Book of Midwifery. R. W. Johnstone, C.B.E., M.A., M.D., F.R.C.S.E., M.R.C.P.E., F.C.O.G., F.R.S.E., Professor of Midwifery and Diseases of Women in the University of Edinburgh. Sixth ed. XXIV and 447 pages, illustrated. Price, $5.50 net. A. & C. Black, Ltd., London; Macmillan Co., Toronto, 1932.

This excellent work meets the demand on the part of practitioners and students for a comprehensive and authoritative book on midwifery of reasonable size and at a moderate price. The name of the author and the fact that the book, which first appeared in 1913, is now in its sixth edition are in themselves sufficient guarantees of its value.

As compared with the fifth edition, which is dated 1926, the arrangement of the chapters dealing with hæmorrhage has been improved; the section on menstruation has been brought up to date; the chapter on the toxæmia of pregnancy has been recast; and changes have been made in the sections dealing with occipito-posterior positions, asphyxia, and ophthalmia neonatorum. A more legible type has been employed and the size of the page increased, so that the book has now a more attractive and readable character. The arrangement of the topics considered is, on the whole, logical, but it seems a peculiar idea to deal with the artificial feeding of infants under the general heading of pathology of the puerperium. Naturally, as one would expect in a book of its size much has had to be left out, but enough information is given in each case to provide a safe lead. We note that the treatment advocated for puerperal infection, while relatively conservative, is not so conservative as that employed in Montreal, where it is not considered advisable to enter the uterus, unless in an extraordinary case, such as when there is obstinate hæmorrhage, and reliance is placed upon general measures and postural drainage. Wise cautions are given here and there in regard to procedures that are apt to become "matter-of-fact" and, therefore, perfunctory. There can be little but commendation for this work.

Synopsis of Gynæcology. Harry Sturgeon Crossen, M.D., F.A.C.S., Professor of Clinical Gynæcology, and Robert James Crossen, M.D., Instructor in Clinical Gynæcology and Obstetrics, Washington University School of Medicine, etc. 227 pages, illustrated. Price, $2.75. C. V. Mosby Co., St. Louis; McAinsh & Co., Toronto, 1932.

This useful little work is designed primarily for the use of students of medicine who are not looking forward to becoming specialists in gynæcology, but is of use to any who desire to the essentials of diagnosis and treatment of gynæcological conditions in a handy and compact form. It is based on the well-known larger work of the authors entitled Diseases of Women. The book opens with a helpful disquisition on methods of examination and the general principles of diagnosis, and then considers the more important pathological conditions found in the genital organs, together with the special diagnosis and treatment in each case. Pelvic inflammation, malformations, disturbances of function, the relationship of the endocrine and other systems of the body to gynæcological conditions are dealt with, and a valuable chapter is added on the invasion of the abdominal cavity. The book is concluded by a chapter on the after-treatment of operative cases. There is a wonderful amount of pertinent information to be found in this handy little book, and it is conveyed in a direct and simple way, so that it can be readily remembered and utilized. We note the unusual feature of instruction as to the preservation of tissue material for future reference to the pathologist—a by no means unimportant matter. Not only the student but the general practitioner will find this work of great assistance.

Handbuch der Gesamten Unfallheilkunde. By various writers, edited by Fritz König, Privy Councillor, Prof. Dr. Med., Würzburg, George Magnus, Prof. Dr. Med., Bochum, In four volumes. Illustrated. Vol. 1, 506 pages. Price, RM 44, Vol. 2, 536 pages. Price RM 46. Volumes 3 and 4 not yet published. Ferdinand Enke, Stuttgart, 1932 and 1933.

As one reads the parts of this momentous work already published one is impressed by the high quality and scope of their contents. They are written by men of outstanding experience in their various fields, medical, medico-legal, technical and administrative. The work when completed, is meant to replace Thiem's "Handbuch der Unfallerkrankungen" which has been the standard book of reference in Germany for many years.

As the title indicates, the four volumes will cover the whole field of the medicine of accidents. The first two deal with legislation covering accidents and sickness arising out of occupation, and with the

INTRAMUSCULAR USE OF LIVER EXTRACT

The administration of liver or of liver extracts has become a firmly established therapeutic measure which restores the blood picture to normal and improves the general condition of patients suffering from pernicious anaemia.

Sometimes, however, patients are too ill to take liver or liver extract by mouth. For such patients, or for any other case in which the physician considers parenteral injection to be desirable, the intramuscular use of liver extract is recommended.

Extensive clinical trials have shown that for intramuscular injection a most desirable concentration of liver extract is such that each cc. of the solution contains active substance derived from 10 grams of liver. A preparation of this strength is now available from the Connaught Laboratories in packages of 5 vials. In each vial there are 10 cc. of a sterile aqueous solution containing active substance from 10 grams of liver in each cc. Injections of this solution may be given daily, semi-weekly, or weekly in doses which range up to 10 cc. As regards a maintenance dose of the extract, clinical observations have shown that patients may be maintained satisfactorily on extract from 100 grams of liver per week, i.e. on 10 cc. of the solution.

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Prices and information relating to the use of Liver Extracts in the Treatment of Pernicious Anaemia will be supplied gladly upon request.

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organizations, public, private and military for the handling of the insured who become sick or injured. Considerable space is devoted to definition of terms from both the medical and legal standpoints. Accidents and diseases peculiar to certain definite types of industry and occupation are discussed, as are also acute and chronic poisonings and diseases such as tuberculosis, lues, tumours and metabolic diseases. The editors point out in the preface that the economic pressure of our times too often results in an attempt on the part of the insured to have their disability attributed to their occupation. The authors' discussions aid the practitioner in arriving at his frequently difficult decisions. Neuroses following accidents receive consideration, and a section is devoted to the psychology of the medical expert himself. The chapter on accident prevention is exhaustive, and describes not only the governmently instituted measures and technical safeguards but also methods of educating the workers themselves in safety first principles. Two chapters with case reports as examples, demonstrate the manner in which the medical expert develops his facts and forms his opinion.

With the increasing rôle played by accidents and occupational diseases in medical and surgical practice to-day, this work should prove of the greatest value to those who give it careful study. It seems to the reviewer, however, that it is too detailed for use by the English-speaking practitioner, and that the wealth of legal matter contained therein would be of little interest or use to the foreigner, unless he were a serious student of social insurance. It indeed demonstrates how intricately involved the whole subject of social insurance readily becomes when an attempt is made to carry it out in a thorough and whole-hearted manner.

Common Skin Diseases. A. C. Roxburgh, M.A., M.D., B.Ch., F.R.C.P., Physician in Charge of Skin Department and Lecturer on Diseases of Skin, St. Bartholomew's Hospital. 322 pages, illustrated. Price, 18s. net. H. K. Lewis & Co., London, 1932.

This very excellent book is one that is sorely needed by general practitioners and students. The index for preliminary diagnosis is unusually clear, immediately leading the student along the proper path to a definite diagnosis. The chapter on general etiology and pathology is one of special interest and might be read with profit by any medical man; also the chapter on general treatment. The description is clear and the plates of the various diseases are excellent, clear cut, and typical examples of the diseases in question.

This book can be unhesitatingly recommended to the general practitioner or student.

Diseases of the Spinal Cord. Williams B. Cadwalader, M.D., Professor of Clinical Neurology, University of Pennsylvania Medical School, etc. 204 pages, illustrated. Price $5.00. Williams & Wilkins, Baltimore, 1932.

Students and general practitioners desiring a small but complete and up-to-date text on affections of the cord will find their needs well met by this book. It is the product of one of the excellent group of Philadelphia neurologists, and leaves little to be desired. The scope, arrangement and material are satisfying and the number and excellence of the illustrations make the presentation both practical and impressive.

The work does not purport to be a comprehensive treatise, and, therefore, will not be particularly useful to those doing special work in neurology, unless perchance they are teachers, in which case it will prove useful as a guide in the arrangement of courses, etc. The general plan is the only logical one for presenting the facts of neurological disease, *viz.*, the superstructure of symptomatology, etc., based upon an adequate foundation of anatomy and physiology. The diseases likely to be met with in general practice are concisely and adequately described, and little time and space are wasted in fruitless theorizing. One might wonder at the inclusion of Thomsen's disease, but doubtless its description is put in to assist in rounding out differential diagnosis. Abundant references to neurological literature up to and including 1931 are supplied, and the book closes with these references collected in a bibliography numbering over 300 items. The letterpress is good, the illustrations excellent and plentiful, the binding sturdy.

Rose Research on Lymphadenoma. By various authors. 136 pages, illustrated. Price, $6.25. John Wright & Sons, Bristol; Macmillan Co., Toronto, 1932.

The contributors to this volume are six in number. The first chapter entitled, "A Clinical Concept of Lymphadenoma or Hodgkin's Disease," is from the pen of Sir Thomas Horder. The next four chapters deal with the various aspects of the research which has been carried on since January, 1920. The contributors to these chapters are the research scholars who have undertaken this work from time to time. Kenneth Stone reports a serological study of yeasts and in the fourth chapter L. P. Garrod outlines the results of further investigations on the character of yeasts. Another section is written by E. R. Cullinan, who conducted a series of hæmatological observations on rabbits and guinea pigs. The final chapter, by Miss B. D. Pullinger, discusses in detal the histology and the histogenesis of the disease.

The clinical chapter by Horder is hardly more than an introduction, as it is only six pages long. The chapters on etiology are full of interest and are well written, but they contribute little positive evidence likely to solve the riddle of the cause of the disease. In the final chapter the opinion is expressed that Hodgkin's disease is neither a chronic inflammation nor a true malignant neoplasm; it is believed to be closely allied to the leukæmias. The text is amply illustrated by excellent gross and microphotographs, many of which are in colour.

A Text-Book of Pharmaceutics. Arthur Owen Bentley, Pharmaceutical Chemist, etc. Third edition. 911 pages, illustrated. Price, $4.50. Baillière, Tindall & Cox, London; Macmillan Co., Toronto, 1933.

This is undoubtedly one of the best texts dealing with the work of the apothecary or druggist, giving a thorough description of the galenical methods and procedures, and methods of manufacture, particularly such as may be employed in the pharmacy. The book is intended primarily for the pharmacist, but there is naturally much in it which would be of value to the physician, particularly to one who does his own dispensing, as it deals with many of the difficulties which occur in the course of preparing medicines for use. The book also contains a thorough description of the biological preparations, including the antitoxins and vaccines based on the recent British Pharmacopœia.

BOOKS RECEIVED

Doctor to a Mother. Management of Maternal and Infant Health. Eardley Holland, M.D., F.R.C.S., F.R.C.P., F.C.O.G., Obstetric and Gynæcological Surgeon, London Hospital, *et al.* 96 pages. Price 1/6d. Ed. Arnold & Co., London, 1933.

Medical Clinics of North America. Vol. 16, No. 4. By various contributors. 257 pages, illustrated. Issued serially, every other month. Price $18.00 (6 nos.) W. B. Saunders, London and Philadelphia; McAinsh & Co., Toronto, Jan., 1933.

Note.—Through error the price of Crile's "Diagnosis and Treatment of Diseases of the Thyroid Gland," was given in our February issue as $6.50. The correct price is $7.50.